

RICE UNIVERSITY

Cultivating Sound: Experimental Music Conservatory

by

Genevieve Rudat

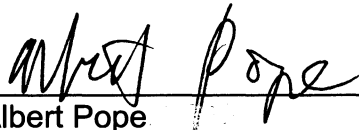
A THESIS SUBMITTED
IN PARTIAL FULFILLMENT OF THE
REQUIREMENTS FOR THE DEGREE

Master of Architecture

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HOUSTON, TEXAS
MAY 2011

ABSTRACT

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This thesis examines the link between sound and perceptual space via the mechanism of the body, through an exploration of experimental music and the design of a conservatory expressly dedicated to its techniques. The use of poché space – here defined as the space between major components of a specific program – is critically considered, and ultimately turned on its head to provide the kind of spaces that support experimental music education and its processes. This new poché space is further linked to circulation, both of the students and faculty as well as the general public. Through the use of these circulation and experimental-space elements, combined in the poché, a new kind of porous field-object is inserted into the landscape of the city of Atlanta, specifically tuned in to its existing cultural spaces, that cultivates experimentation and participation to create entirely new forms of music.

Acknowledgements

Thank you to the wonderful instructors and students of RSA, especially Carlos Jimenez, without whom this thesis would be nothing but a dream.

Thank you to my loving fiancé, for putting up with me through the years of hard work, and for always encouraging my best efforts.

Thank you to my parents and siblings. You are, as always, an immense source of love and inspiration.

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Cultivating Sound: Experimental Music Conservatory

1

Sound and Perception in Architecture

Sound, a crucial component of the perception of space, is by nature a device for fragmentation, the pieces from which are then reassembled into a whole via memory and time. Current architectural responses to typical sound-based programs rely on isolation, a kind of fragmentation that is then solidified by the current understanding of *poché* to prevent a re-formation in the architectural scale of experience. Programs of music performance, especially schools of music, are typically designed using this formula and are fertile grounds for rethinking current architectural designs and decision-making – and ultimately the implications in the way music is understood and physically created in a space.

The perception of space and time relies on external cues relative to an observer. Sound, because of its interaction with objects and materials and its relatively lengthy dependence on time, often acts as a basis for this perception. Although the visual field tends to dominate conscious acts of perception, sound and its peripheral effects – the aural field – remains equally important. This is especially the case in programs that are sound-based; occupants will be conditioned to consider cues given by sound more readily than in other spaces, meaning these kinds of institutions offer unique opportunities for emphasizing these qualities of sound and its impact on perception.

Sound itself is serial in nature; its relative low frequency and direct bodily impact² allow the unconscious perception of sound waves' highs and lows over time, mapping a space in four dimensions while simultaneously fragmenting the way that space is perceived (Fig. 1). Rather than creating an instantaneous snapshot of a space, sound slowly unfolds and breaks it down into a series of frame-like components. Bodily memory then reforms these drawn-out parts into an assembled whole – a reconstruction that exists only in the mind. Although most analogous to film because of its literal frames and fragmentation, mapped through time, this kind of breakdown and reformulation also occurs in the experience of architecture (Fig. 2). Each singular piece of experiential knowledge, which is only a small aspect of the entire building, is added together through time and memory, recreating a new kind of whole project within the mind. This phantom projection remains as important in the understanding of the building as a whole – and its potential, in this case, for creating new kinds of sounds and performances – as its individual moments. The institution must therefore be considered not only as a collection of smaller parts, the aforementioned frame-like components, but also as a whole body, both literally as a figure in the landscape of its context but also conceptually as the reconstructed version of small, individual sound-based events (Fig. 3).

Traditional methods of dealing with sound-related programs generally allow for only one kind of fragmentation to occur. In these cases, different types of program elements are separated from one another by a kind of solidifying poché.

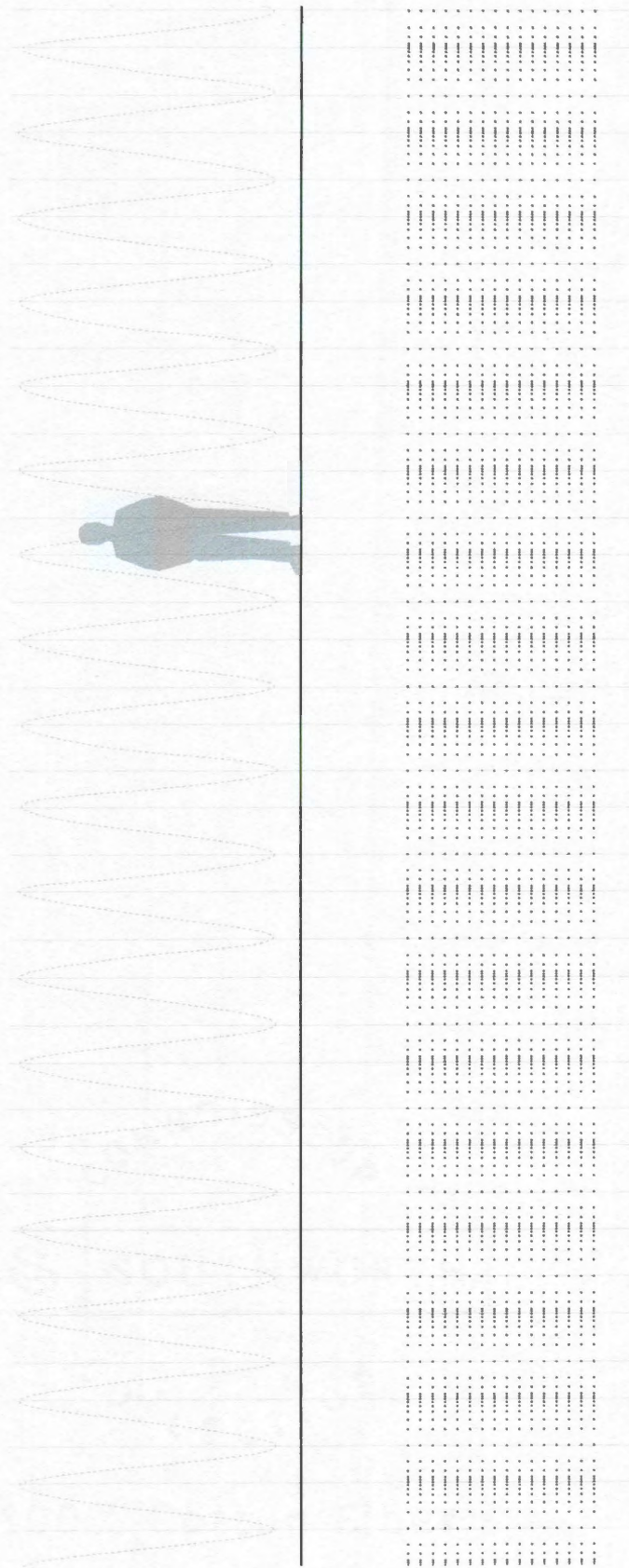


Figure 1: Sound as both wave-forms and a series of frames (compression and release).

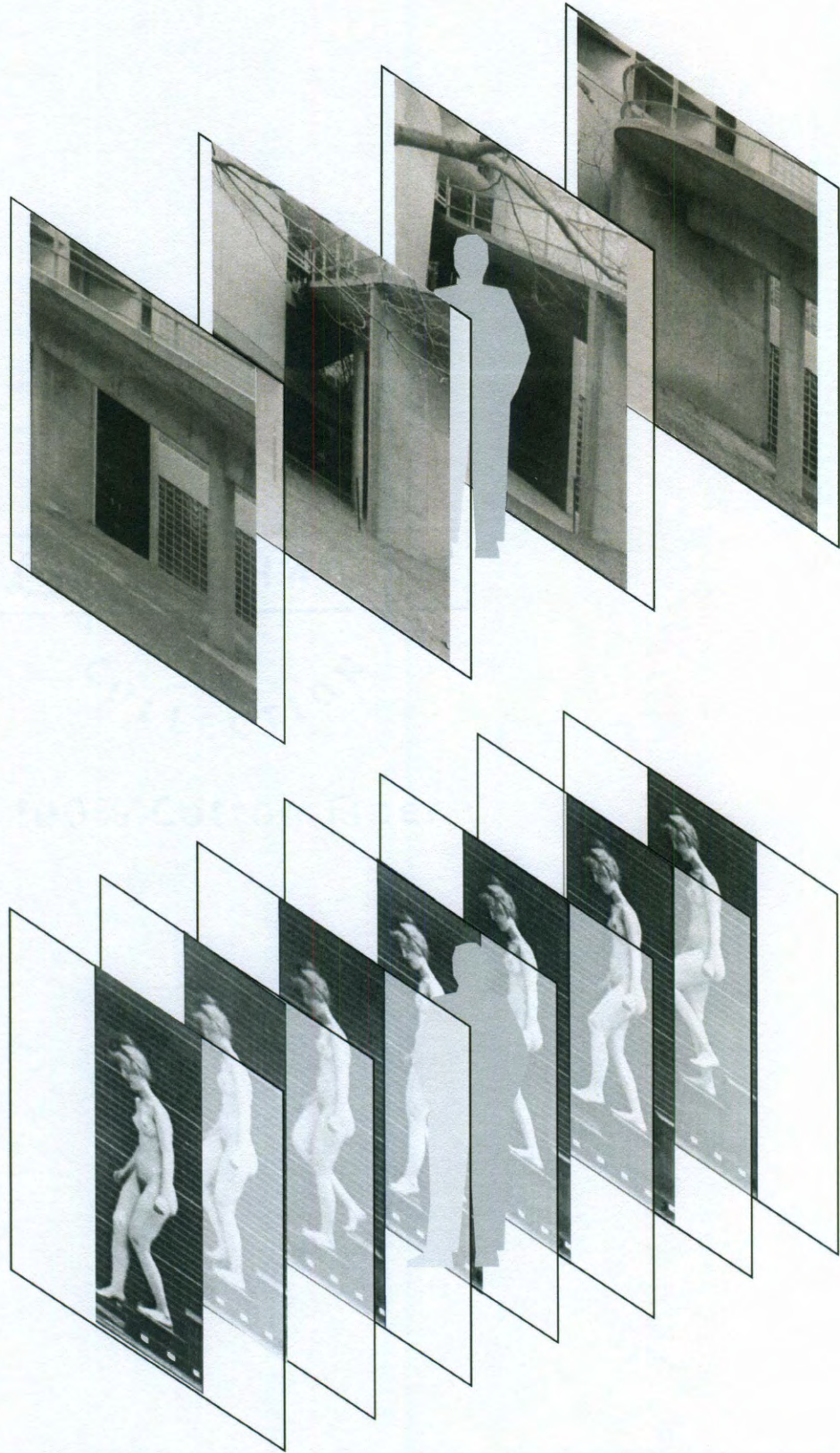


Figure 2: Architectural experience as a series of frames; film as a series of still frames

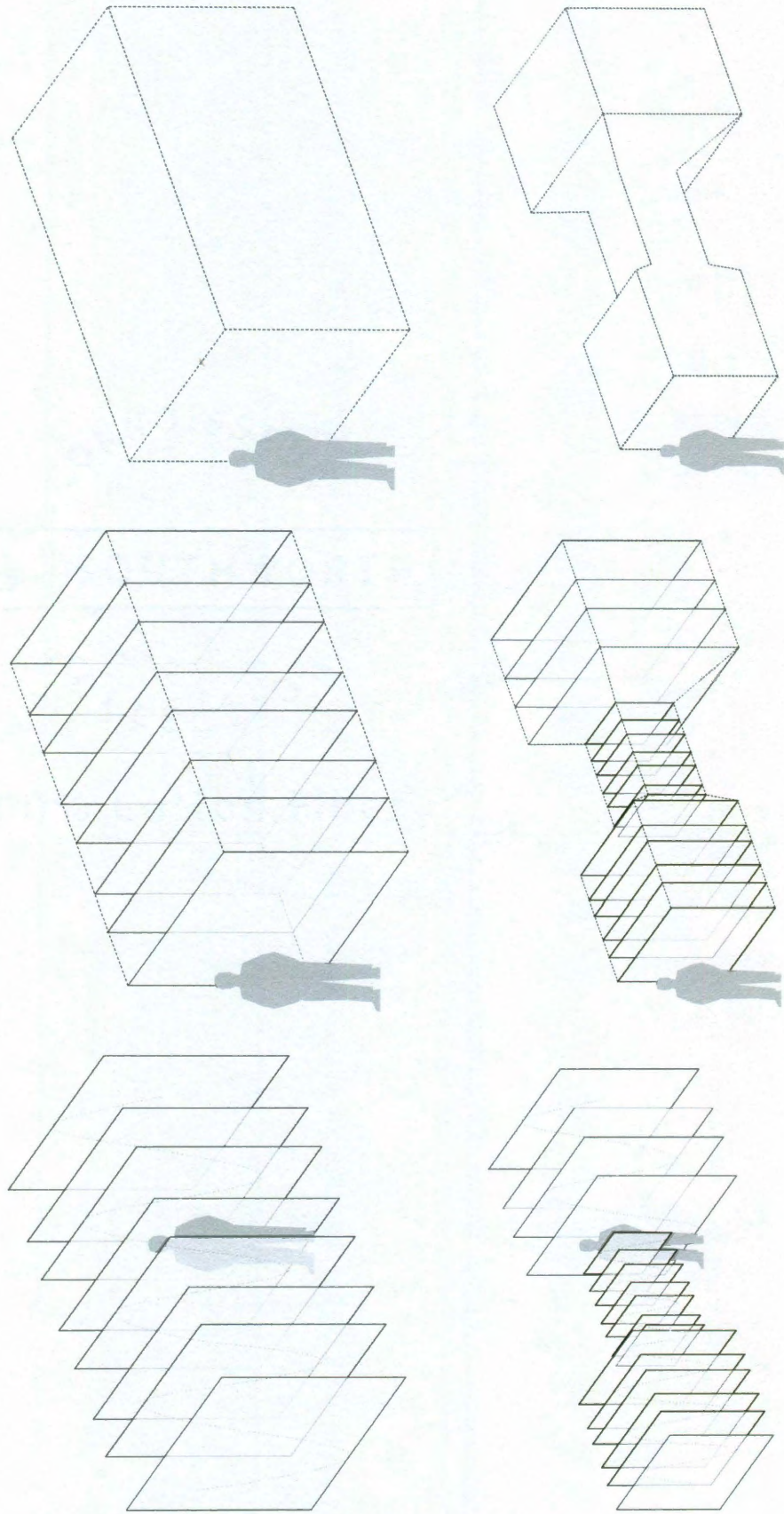


Figure 3: Experience from a series of frames to a solidified collection of memories (field to object).

This divides each individual room or chamber, preventing a merge or re-formation from occurring. Often, the re-formation is further discouraged through the specialization of each room; rather than allowing individuals to experiment and move around, specific idealized conditions encourage independence from other performers, environments, and sounds. Much of this isolation is due to the way in which the environment is strictly controlled; an “ideal” formulation is found and repeated, disallowing experimentation and change. When these conventions are broken out of – as is the case in some installations, or the structure for the opera *Prometeo* – more interesting and fruitful experiences are encouraged and even cultivated, creating a much richer experience for both performer and audience.

The school-type program in particular becomes a field of poché in traditional conservatory design, into which its individual elements (practice rooms, rehearsal rooms, performance halls, and other pieces) are inserted (Fig. 4). These spaces are often repetitive and idealized, and although they may have a large combined volume, there is often little room for play or different typologies. This can be considered as a site of potential intervention, rethinking the way that the institution of the conservatory both responds to its context and the individual elements’ connections within the site. This first requires a complete reassessment of typical program elements and how they may be reconfigured or deployed differently. It also requires an understanding of how these elements relate to one another, not only in their environmental qualities but also in their interactions with the program users, both private and public.

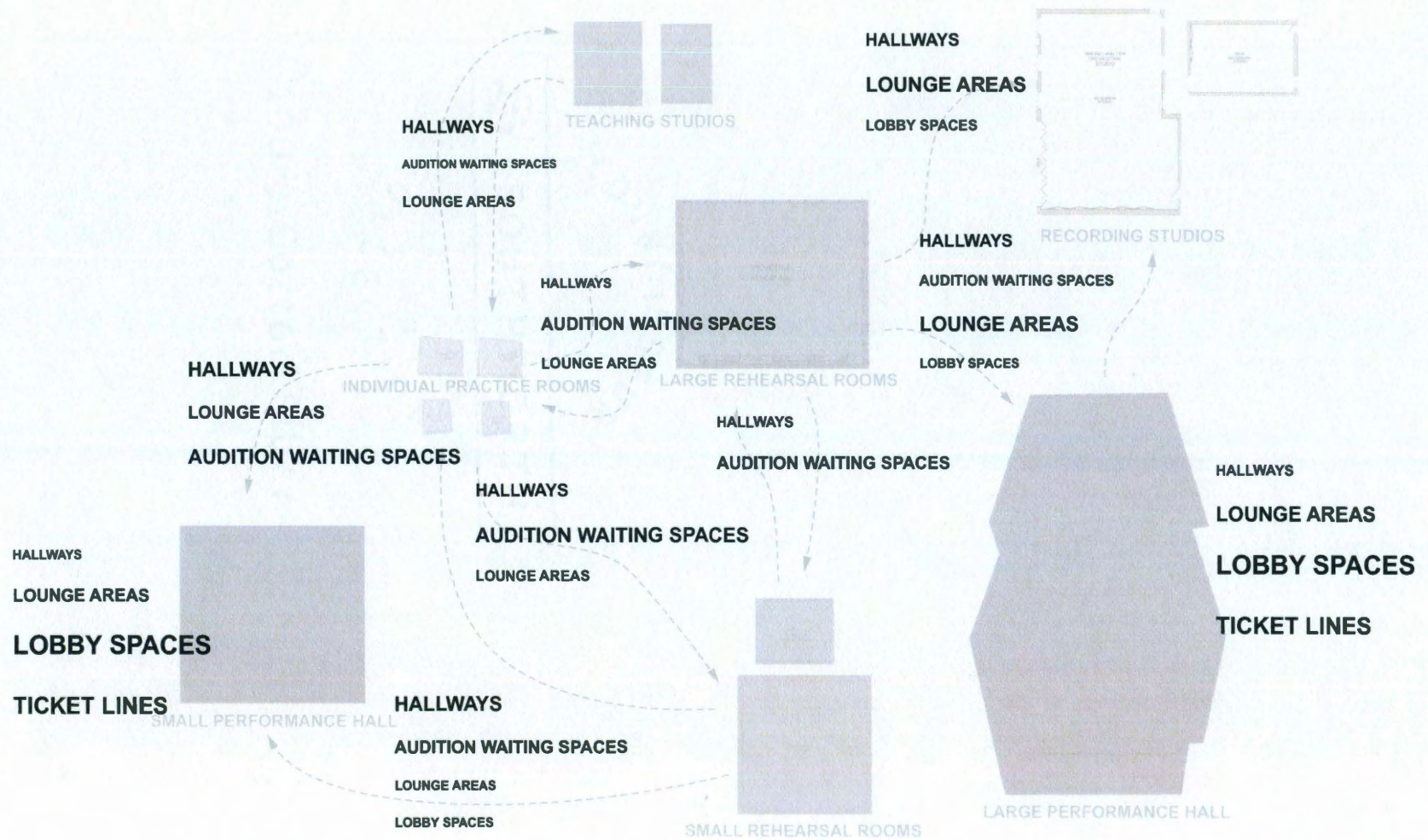


Figure 4: The network created by the users' experiences within a music school reconnects the previously-separated individual elements.

Rethinking the conventional methods and ideas behind sound-based programs, and infusing new designs with an understanding of the way sound works with perception, space, and time, is one way by which architecture can escape the conventions associated with typical implementations of these kinds of programs – and escape the overarching tyranny of visual space. Additionally, such consideration can begin to account for entirely new forms of composition, practice, and performance, which currently are left out in favor of traditional methods of building the conservatory as a program (Fig. 5).

Experimental Music

A rethinking of conventional methods requires an equally unconventional type of program to support its interests. Traditional conservatories have the tendency to be equally traditional in their choices for building design, rejecting innovation in favor of long-established “ideal” forms. Experimental music, on the other hand, has less institutional support, yet provides the opportunity to test out new ideas in the form and function of music schools. Few places exist that truly allow students – both composers and performers – to learn, test, and invent the kinds of techniques and practices that experimental music encourages; even fewer schools have the resources to devote to teach these new developments in the fields of composition and performance. A conservatory dedicated to teaching experimental music both fills a need in the music education community and allows new architectural ideas about the interaction of sound, space, and perception to be taken to a new level. The main focus of this new kind of

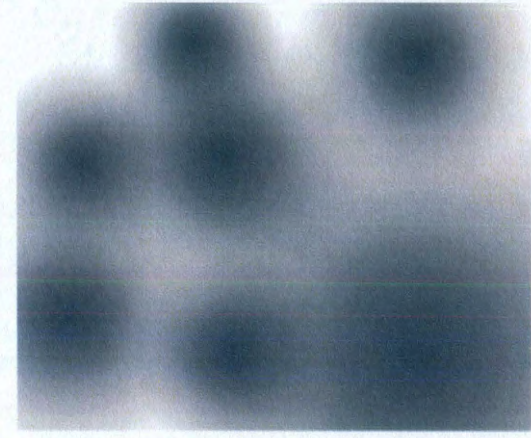
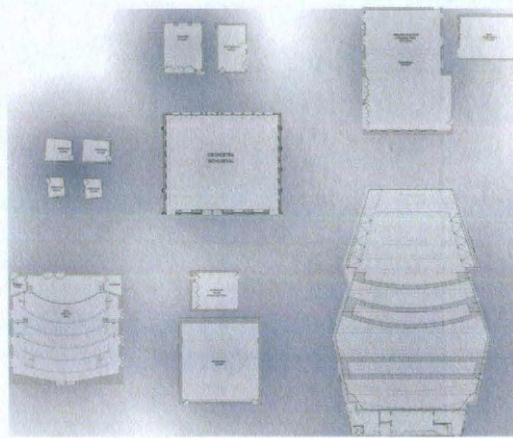
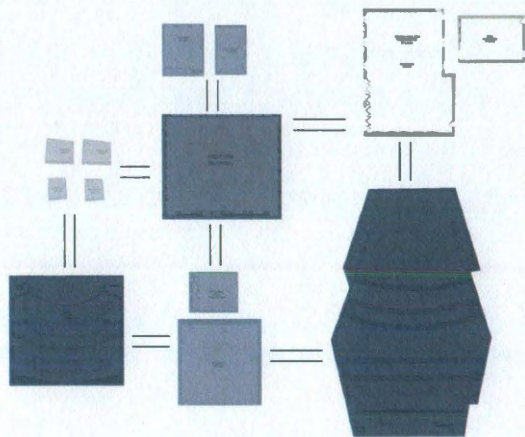


Figure 5: A collection of individual elements of program (for the music school), originally made highly independent; blended into a field; a music-school field that incorporates all individual elements while encouraging a more fluid understanding of the collection as a whole.

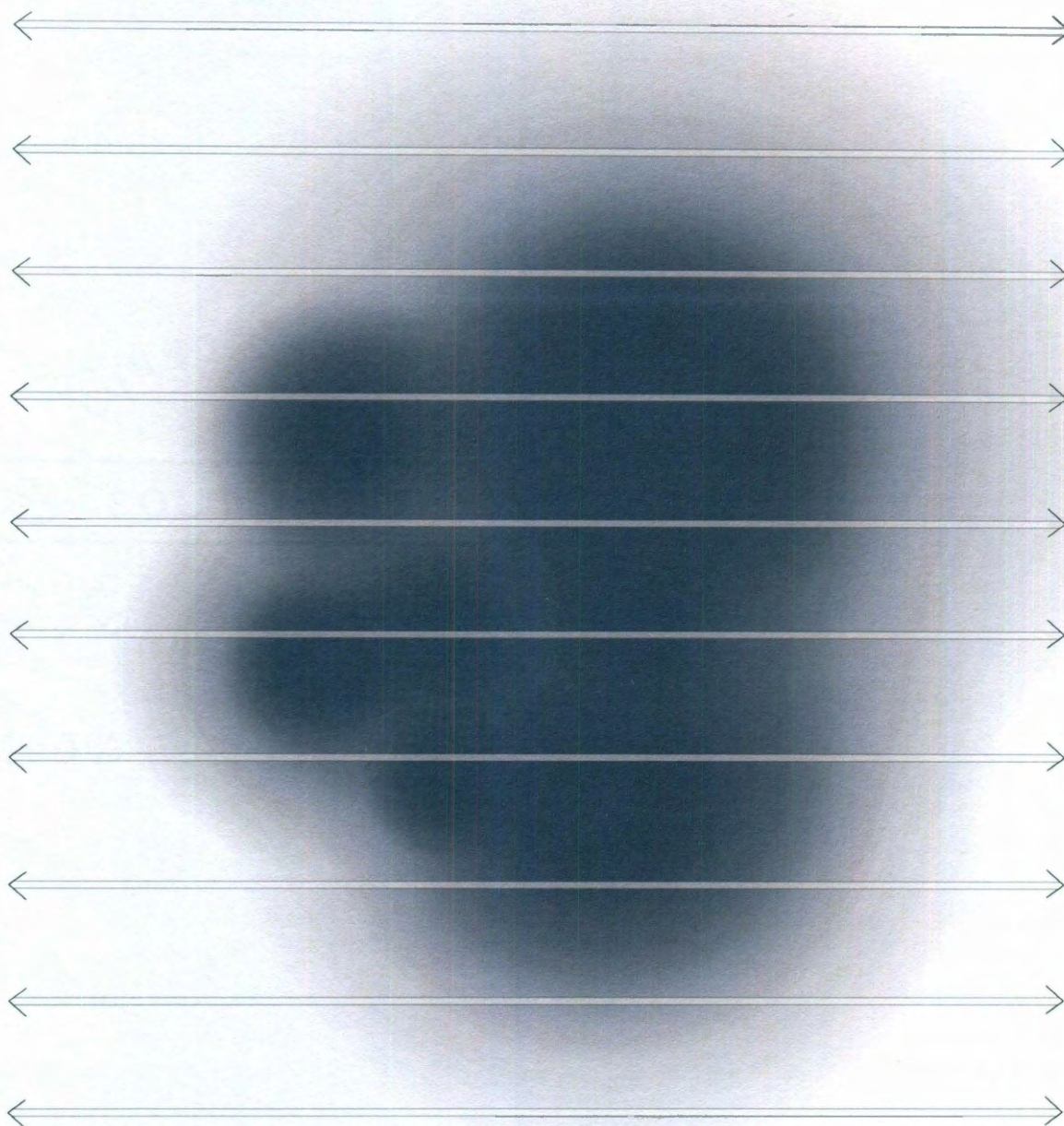


Figure 6: The school-field itself is divided by the frames created through experiential perception. Slices of this experience make up the whole of an individual's understanding, yet may only represent a small percentage of the actual figure or field.

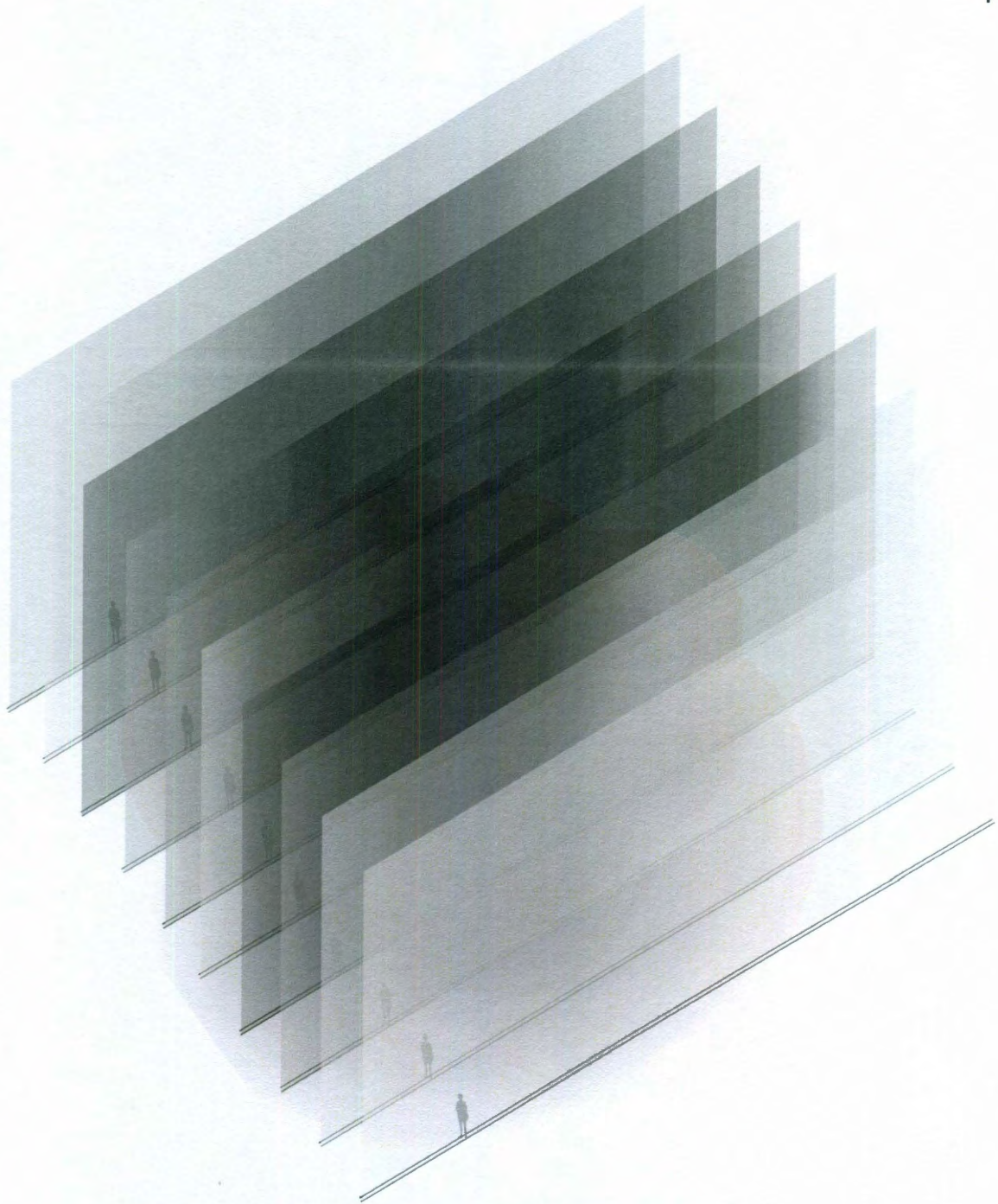


Figure 7: The frames of experience in plan (Figure 5) can also be understood as a complex series of thin-frame sections. Together, these coalesce to form the total perceptual experience of the individual.

conservatory is therefore the cultivation of sound – both in the education of techniques and in the design of the building specifically meant to encourage new forms of composition and performance through architectural means.

As a sound-based program, the experimental conservatory's emphasis should be on its ability to encourage and cultivate sonic qualities, in opposition to more typical visually-based strategies. The research is therefore directed toward finding appropriate sound-based solutions, with an emphasis on flexibility and variety outside of the idealized norms seen in most conservatory programs.

In addition, although the school itself needs to remain at a relatively small enrollment level, the ability to hold (and encourage the flow of) a larger number of people is important to maintaining a level of new and interesting insights into the school's performances and research. The combination of sound-based, innovative designs with the need to allow a kind of porous, publicly-available space drives the initial design research as well as the end result.

Precedents

While there are no exact precedents of a music school dedicated to the teaching and performance of experimental music, two kinds of existing buildings are especially helpful in exploring the potentials of such a program. Existing conservatories suggest a typical or traditional model of music education at the college level, which can then be adjusted to better fit a system of experimental music in both program and architectural design. Sound-based art installations and freestanding structures suggest more radical methods of dealing with the

problems of sound, performance, and audiences; these insights can be extrapolated and applied to a larger institutionalized program.

Successful conservatories across the United States provide a relatively wide-ranging look at existing models. In particular, new and newly-renovated schools such as Juilliard offer an understanding of current modes of thought regarding music education. The new Alice Tully Hall, designed by Diller Scofidio + Renfro, is a particularly interesting case (Fig.8). Though visually the building is decidedly – and spectacularly – contemporary, with a highly-polished look in both its exterior and interior, much of the building still operates within traditional norms that dictate the forms, materials, environments, and operating qualities of the institution as a school. The practice rooms, which line both sides of the building on several floors, highlight this condition well; these spaces are highly repetitive, each nearly identical to the last with remarkably little variation. This is a typical response to the need for practice rooms and similar spaces; it can be easily compared to the Royal Academy, one very typical example of a traditional-style music school. While Juilliard tends toward the vertical and the Royal Academy toward the horizontal, a similar tendency toward repeating an idealized practice space can be seen. The more innovative interiors, as is almost inevitable in these cases, are seen in the performance complex – those spaces that have the highest visibility and most public impact. Other spaces break out of the more normative ideals, suggesting that a somewhat higher flexibility of environments can be desirable even in a traditional conservatory setting. These rooms tend to

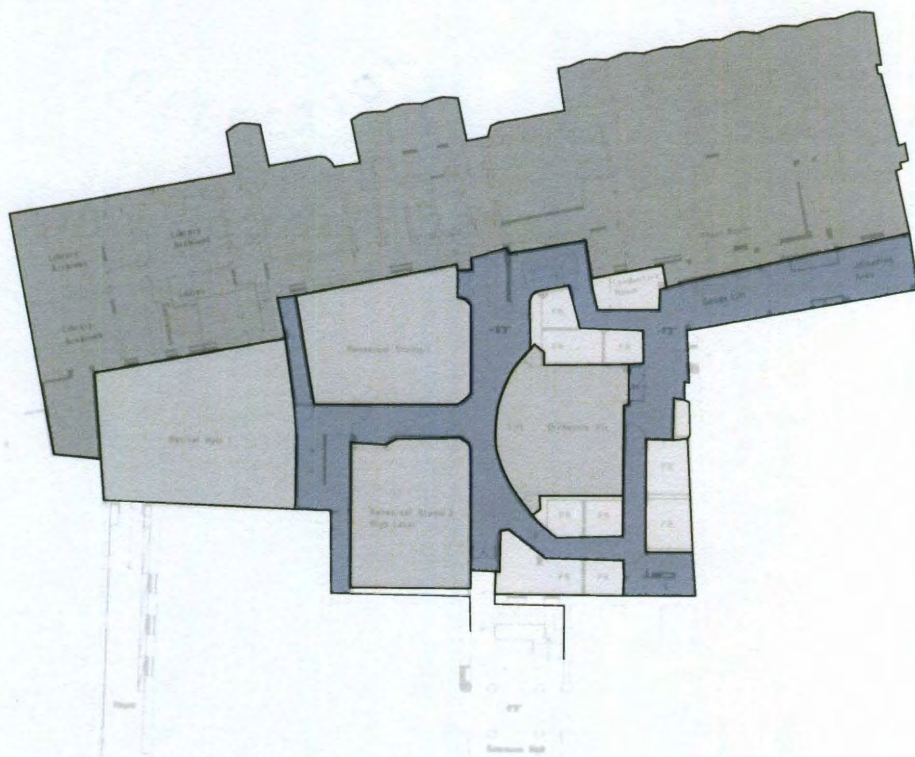
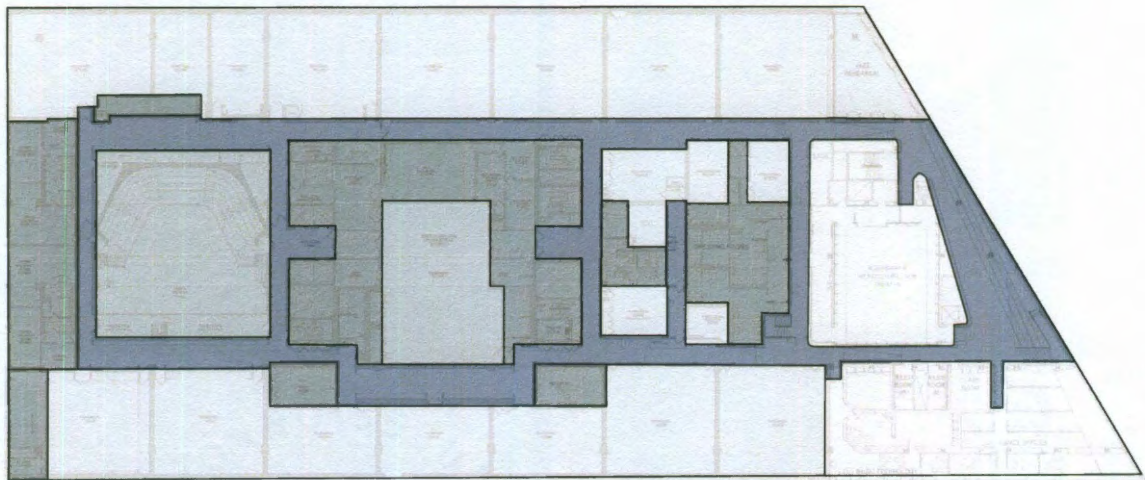


Figure 8: The Juilliard School (top) and the Royal Academy (bottom) both codify traditional expectations for stand-alone conservatories. The darkest grays are service and storage areas; light grays are practice and rehearsal rooms; and the blues are hallway or other "leftover" spaces.

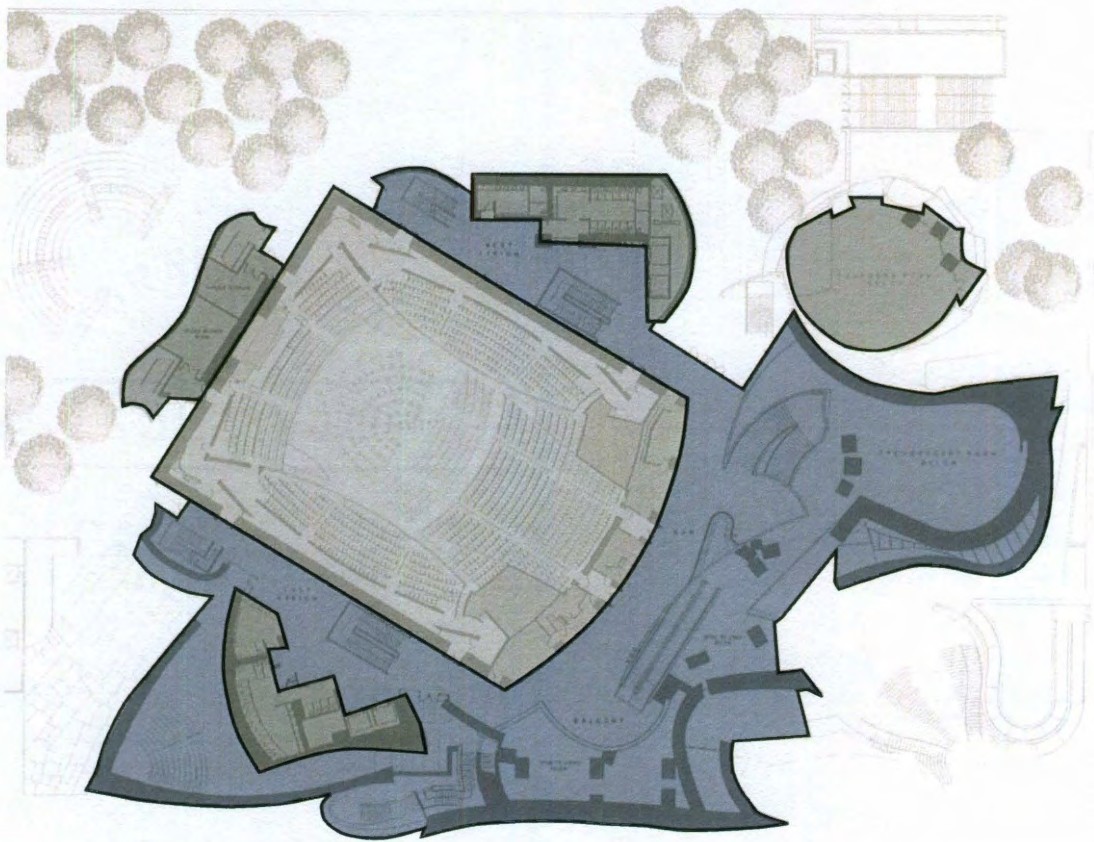


Figure 9: Frank Gehry's Disney Concert Hall, while slightly different in program and design intent, also shows the amount of separation between significant elements in a music-related building type. Again the blues are hallways and other "leftover" spaces (here also including lobbies and other public areas).

be placed either in the center of each floor, where hallways are used to absorb the differences in room area, or the more awkwardly-shaped lifted corner of the building, which has a steep angle and a highly reactive interior form, as opposed to the standard proportional rectangular configurations used in the rest of the building. Here, the tendency towards the use of *poché* as a shape-absorbing mechanism – leading to its further use as a way of making rooms more isolated and independent from each other – works well in combining both very traditional elements as well as specialty areas that require different standards, such as jazz or percussion studios and recording spaces. In the experimental conservatory, this standard gets stretched beyond its customary limit; each space is now made to be a potential “specialty,” rendering even the most typical elements as nonstandard.

Although many conservatories were built expressly for the purpose of music education, a number of well-regarded schools, such as the Curtis Institute in Philadelphia, were adapted from older, preexisting buildings. These adaptations, which can be changes in both form and material but are often limited to material alone, show some successful ways in which relatively limited building types can become more flexible in the environments they produce. Most of Curtis’s buildings are historical, either completely (or nearly completely) the same as their original interior form or gutted and renovated for the school. Most of the institute’s spaces meant for musical studies must therefore conform to a relatively confining existing space and its structure. This results in small, rectangular

spaces that are somewhat tightly grouped, separated by thick, nontransmissive walls and corridors. The constraints result in the tendency to rely on material finishes to create appropriate acoustic environments; the highly repetitive forms tend to lead to equally repetitive and idealized standard room types, limiting the potential range of conditions in which to learn, practice, and perform. For a small, rigorously specialized institution like Curtis, this can be considered a benefit, but for a school with wider variety, or a school that needs the kind of flexibility as an experimental conservatory does, this repetitive quality is instead detrimental. This inflexibility toward the final acoustic product, however, is useful in understanding how the original forms of the rooms affect, and can be transformed by, different material finishes. While the environments of each individual room are determined by a combination of form (including spatial volume) and materials (including their varied applications), in this case the form is highly controlled by existing constraints, forcing all of the decision-making and environmental control to the choice and application of materials.

Still others are built in a kind of half-specialized manner, utilizing typical university-building design while applying some understanding of acoustics and other music-school-specific needs to their internal forms. Rice's Shepherd School of Music is one example of many; as with most buildings of this type, the school is not a freestanding institute of music but rather one department or school within a larger university system. Although both form and material are altered and adjusted based on the needs of the school of music – incorporating taller

ceilings, some angled walls, and specialized materials are all common in these places – the basic layout is similar to other campus buildings: wings of hallways with repetitive rooms behind them, sometimes including modular practice rooms, plus structurally independent performance halls based on traditional, currently accepted models of these spaces. In the case of the Shepherd School, although the practice and ensemble/studio rooms are not off-the-shelf modulars, a limited number of room types are available; within a wing, these rooms are repeated, and each wing is similar, if not identical. The available performance spaces are altogether separate from the remainder of the school's functioning rooms, effectively separating not only practice and performance but also the "public" act of performing from the "private" act of practice. This dichotomy is reinforced in both overall design and in its details, with choices of materials, ornamentation, and the placement of other elements such as structure all creating an effective barrier between the lobby/performing/public spaces and the hallways/practice/private spaces behind them. There is very little intermix between the potential public or audience members and the students and faculty in their daily operations. Stand-alone conservatories have an opportunity that in-university schools of music do not: the potential for the freedom and flexibility of both form and operation, which a school emphasizing experimental music is more able to fully embrace than their traditional or university-tied counterparts.

There have been a large number of installations and other sound-based works of art, particularly following the work of composer/artist John Cage as well

as the “sound art” movement in the 20th century. These include the works of artists such as Bernhard Leitner in the exploration of the merging of sound and space; in his *Spatial Grid* (Fig. 10), and other similar works, perceptual space is literally created out of sound: tones played through three-dimensionally-mounted speakers (sometimes also in motion) suggest a sound shape, often surrounding the listener. These can be considered not only as the simple shapes created over time, but as a collection of individual frame elements, each superimposed on the others, that are then re-integrated by the listener’s memory – a space consisting solely of perception, made through sound. This leads naturally into architecture while questioning the nature of both performance (the sound itself) and audience (the listener). This line of inquisition is at the heart of some of the ways in which experimental music operates. A number of architectural works by Renzo Piano are also highly relevant to the discussion. In particular, both *Prometeo* (Fig. 10), a freestanding interior installation built expressly for the performance of a specific composition, and IRCAM, a research-oriented institution dedicated to a greater understanding of music/performance and the acoustics of instruments, are useful to consider when examining how a radically different pedagogy might be implemented as architecture. The structure for *Prometeo* is unique in its specificity to a singular composition and set of performances, and in its simultaneous creation with Luigi Nono’s composition *Prometeo*. The installation/performance space was built specifically for the interior of an existing Venetian church, raised off the floor but also ceilingless and porous, meaning both the structure and the church interior had an influence in the performance and its

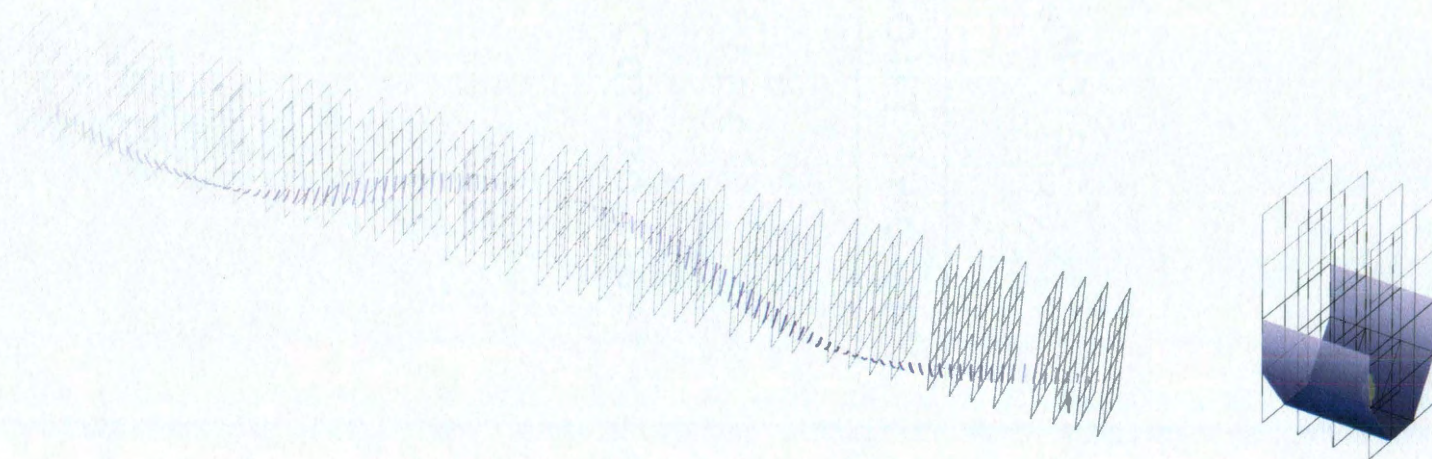


Figure 10: Leitner's work *Spatial Grid*, a space made of sounds produced through three-dimensionally-mounted speakers, here shown both as a complex, time-based shape, as well as its compressed form created via memory.

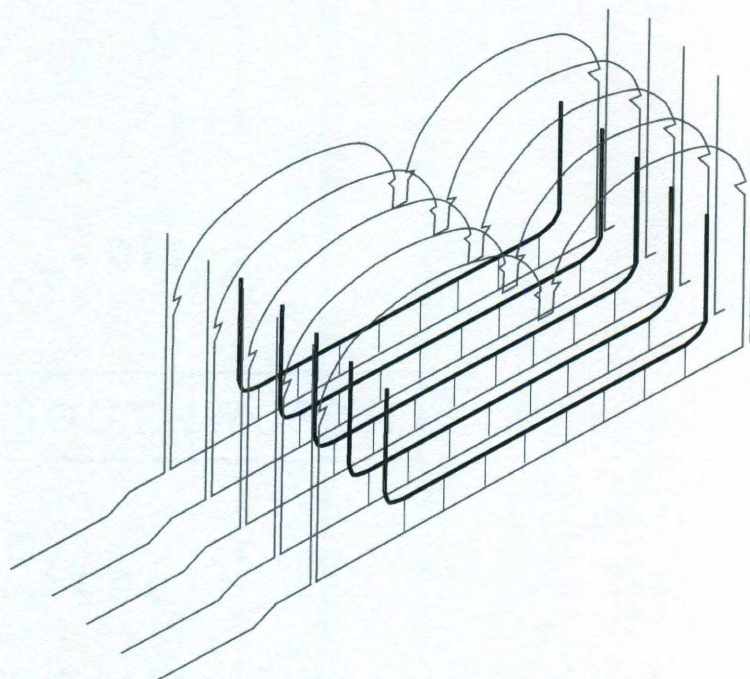


Figure 11: The structure for Luigi Nono's opera *Prometeo*, shown here as a series of experiences mimicking its wood-slat structure.

acoustics. Scaffolding and balcony areas were built into the sides, with the audience sitting in the bottom center of the structure, allowing the performers the capability to move during the piece, which Nono wrote into the work. Both form and material – a simple ark shape made from bone-like forms of composite wood – are combined along with the composition itself to create a synthesis of music, performance, and architecture. The way in which this occurs is useful in considering how experimental musics might be performed, and the demands potentially made on the structure of the conservatory. For example, the relatively straightforward new ability to move in all directions, including vertically, places a greater demand on the architecture than is traditionally made by classical music performance. The flexibility of the structure in providing unusual environments is

therefore much more important in an experimental conservatory than a traditional one. The IRCAM project also provides some insight on the expectations and needs of experimental music in an institutional form. Although not meant as a school of music, its goals as a research-oriented institution can be considered somewhat in line with those of a conservatory. As a very small building, its program placement is of particular interest. In order to provide the maximum amount of acoustic independence, each program element is not only made almost completely structurally separate from others (especially in cases such as the recording studio and the main experimental space) but all of the acoustically-oriented programs are also placed underground, with only offices in the above-ground structures. The main space is also highly adaptable, with a completely movable wall and flooring system as well as scaffolding that enables a three-dimensional exploration of acoustical studies conducted there. This space serves multiple functions; not only does it act as a research and practice area, but it also acts as a performance space as well. This kind of flexibility – enabling practice and performance to occur in the same space, while also allowing these needs to change over time – is crucial to both the teaching and the practice and performance of experimental music.

Design Research: Site, Material, and Form

Site Selection: Midtown Atlanta, GA

Atlanta, Georgia is well-known for its popular music scene and has a number of music-related programs, organizations, and events, including a symphony orchestra. In addition, there are many recording studios and public and private venues that host popular and independent music formats. However, unlike many major cities, Atlanta does not have a high-quality, college-level music education program to support the endeavors of its more classically-oriented musicians, especially its orchestra. While there is support and work for these professionals at a paying level, their education is generally received outside of the state. Both economically and programmatically, the city can benefit from the inclusion of music education facilities in combination with an effort by this institution for a broader kind of public education in the form of participation and performances (Fig. 12).

Midtown, Atlanta's cultural district, is currently in the process of upgrading its facilities and cultural attractions as they continue to bring in tourism and public interest to the city. The heart of this district is the section of Peachtree Street occupied by the High Museum, as well as the Woodruff Arts Center and the stop on the Metropolitan Atlanta Regional Transportation Authority (MARTA) train for the area. As the museum and symphony continue to gain prominence in the arts world, this district will similarly rise in popularity, and as a highly public site it offers an opportunity to tie in the public-education mission of the

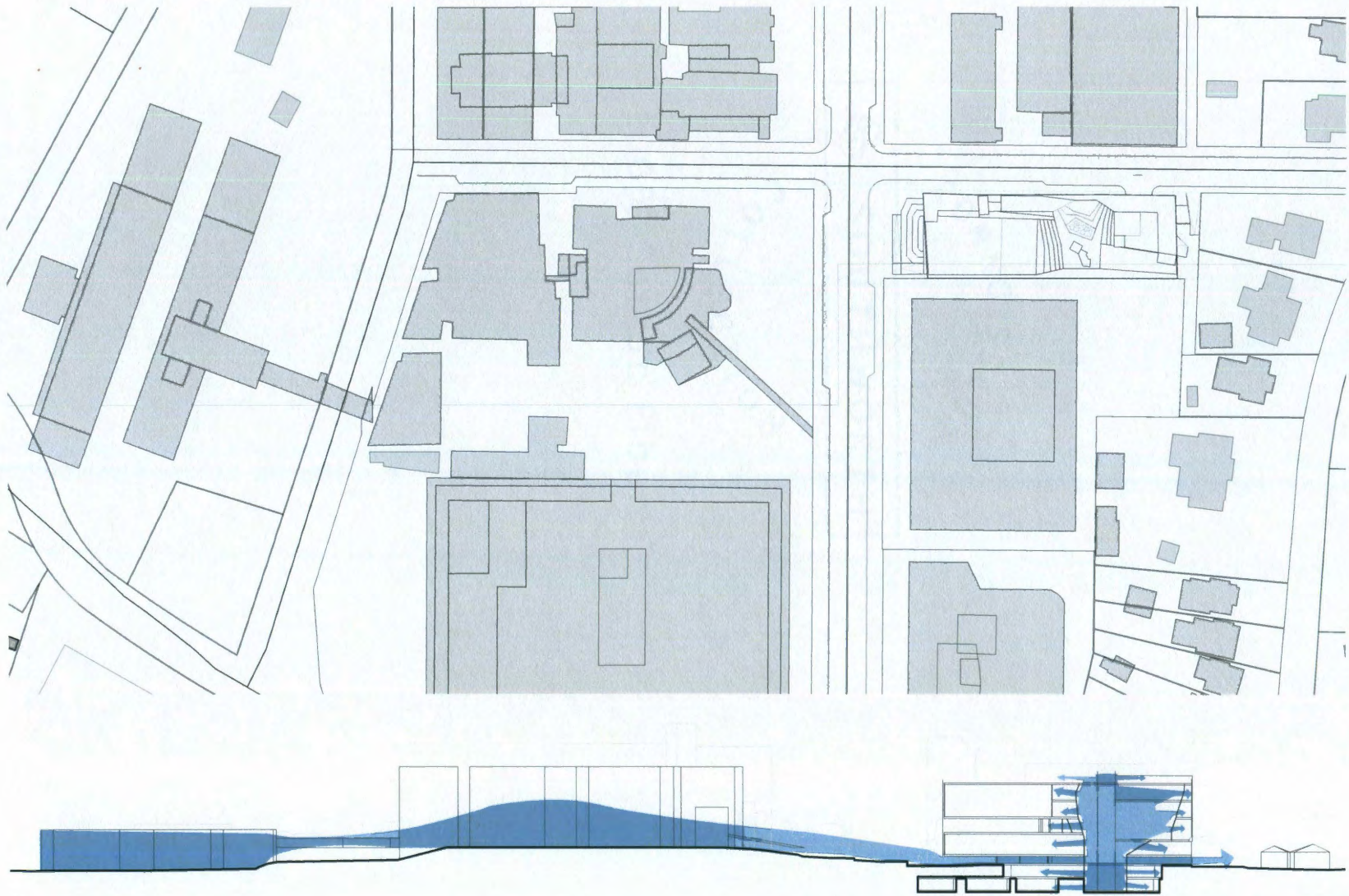


Figure 12: Site plan and site section of Midtown Atlanta, the site, and the buildings in addition to the conservatory. The blue shown in the section represents the public's involvement across the existing spaces and through the proposed conservatory building.

new conservatory. This cultural heart of the city therefore becomes the most appropriate place to site the experimental conservatory program. A small lot facing Peachtree Street and 13th Street, next to the site of the future One Museum Place building, allows the conservatory a physical connection to the existing arts complex buildings while keeping it separate from the generally public programs of the museum and art center. Together with these programs, it begins to form a social triangle that strengthens the public heart of the city through education and cultural programming. Both the general education of the public, in understanding and appreciating a wide variety of musical forms, and the specific education of new musicians, are useful programs to enhance Atlanta as a city and Midtown's cultural offerings to its citizens and visitors.

Materials Research

Both form and material greatly affect the acoustics of a space and therefore have a large impact on the implications of a given design. The acoustic properties not only inform the occupant of the potential uses of the space (for musical choices in particular) but also change the "feel" of the room – whether intimate, cavernous, quiet, or any number of similarly spatial types and qualities. These initial choices are crucial in a conservatory program, where perception of these qualities can drastically affect the outcome and success of the program.

The basic properties of materials that affect their acoustical performance can be divided into two categories: those that are inherent in the material itself and those that are the result of their application (Fig. 13). It is the combination of these

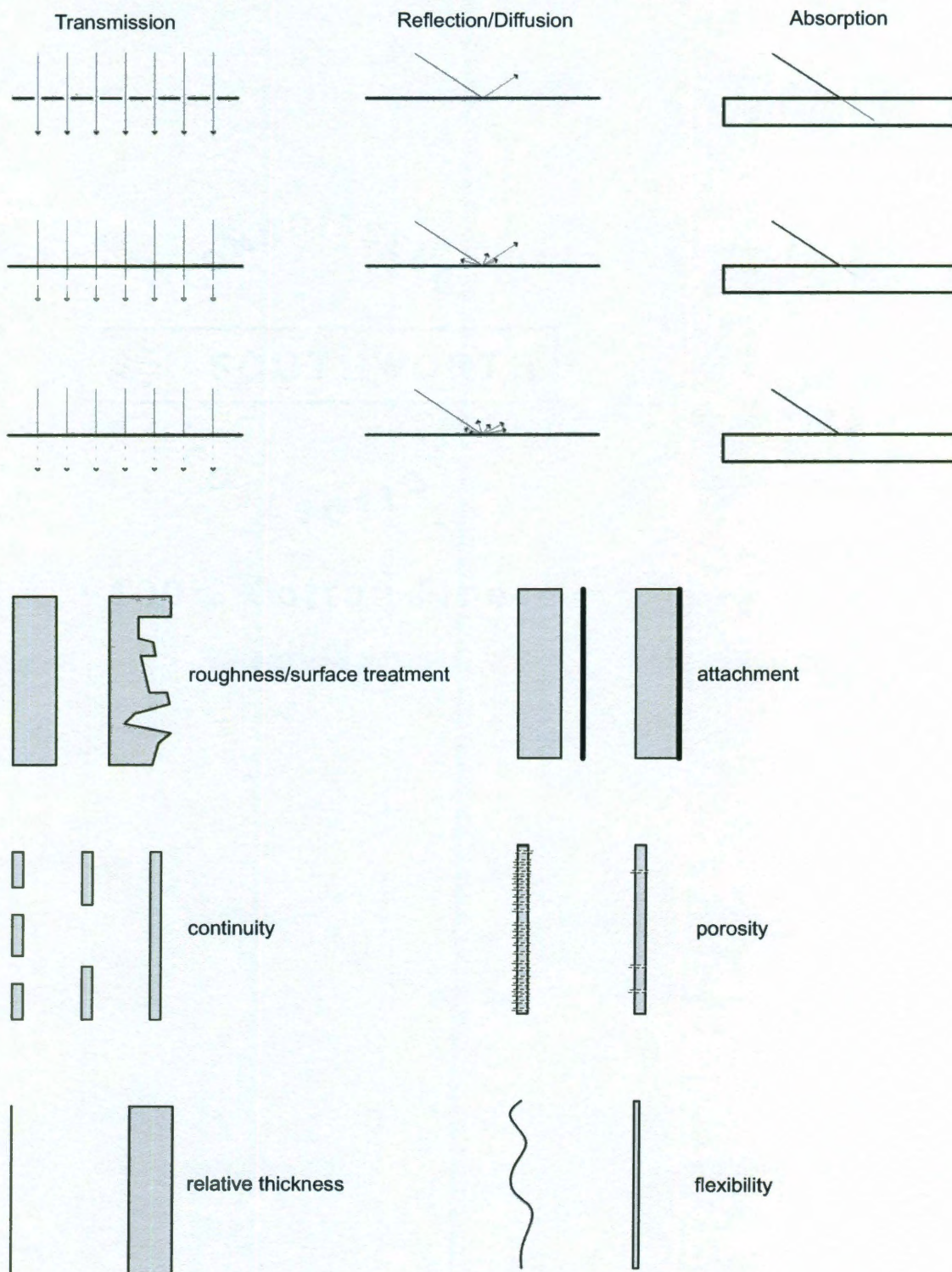


Figure 13: Basic properties of materials, including directly acoustic properties (transmission, reflection/diffusion, absorption), and properties that may be changed by application.

properties, which may overlap, that produces the acoustic perception resulting from the application of the material. Additionally, the properties of each material application interact with any others present in a space, creating a more complex sonic result.

The inherent acoustic properties of a material can be simplified into the three qualities that make up the majority of its acoustic effects. These include transmission, absorption, and reflection. Transmission refers to the amount of sound that passes through a material, enabling it to be heard on the opposite side. Absorption refers to the amount of sound energy actively absorbed by the material. Reflection refers to the amount of sound bounced back from a source, as well as the type and quality of this bounce. Both transmission and absorption are measured on a sliding scale, from highly transmissive or absorptive to having close to zero of that quality. Reflection is a slightly more complex property, referring to both a quantity and a type or quality – from basic specular (essentially one-dimensional) reflection to diffusive (multi-directional) reflection.

Together, these three basic properties account for the majority of a material's acoustic response, directly relating to the perception of the room once it is applied (Fig. 14). In general, both specific materials used for acoustic purposes as well as common building materials act in a consistent and predictable manner. These common materials are shown in Tables 1 and 2, with their typical inherent properties as they relate to most normal applications.

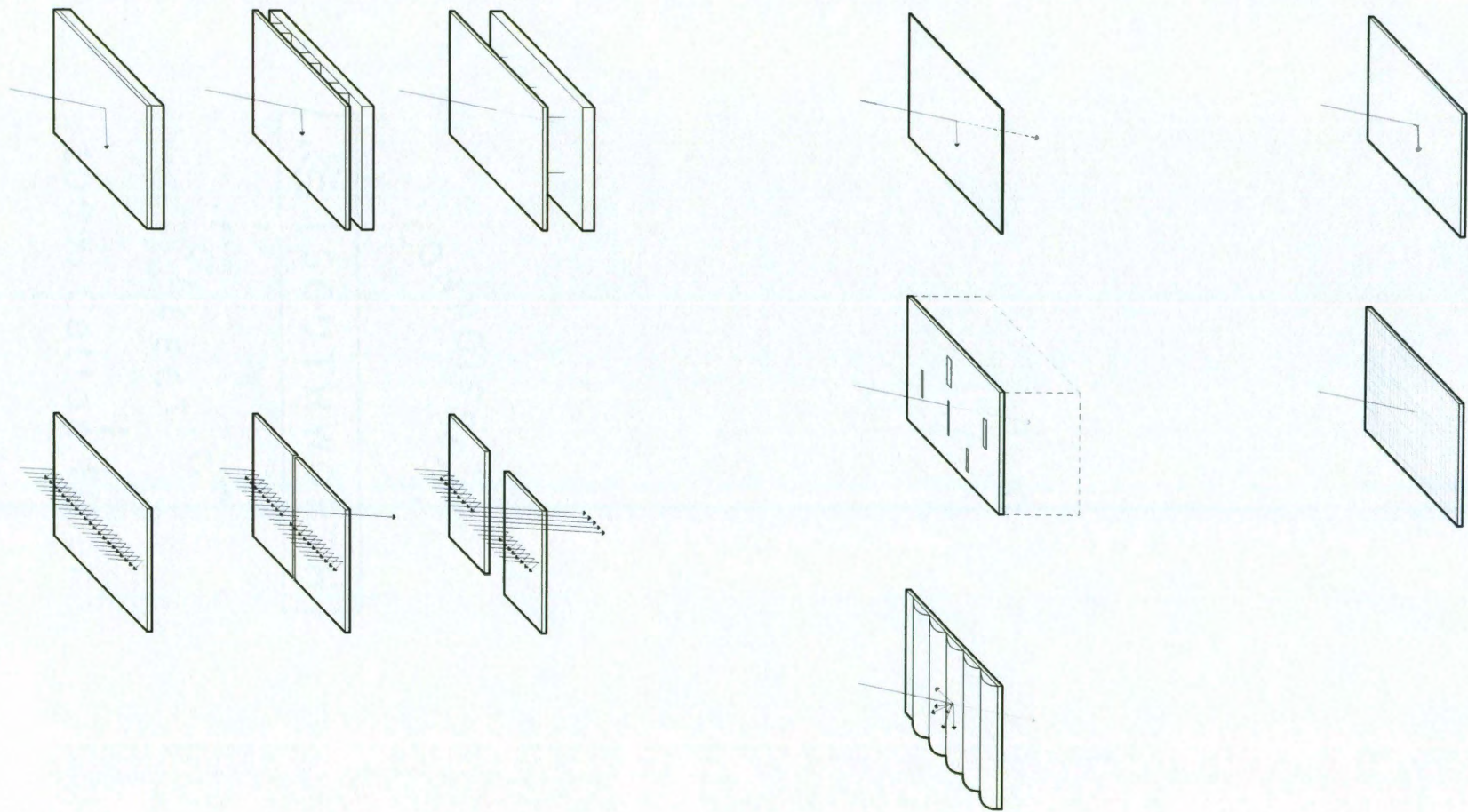


Figure 14: The deployment of materials plus different application properties creates various kinds of acoustic outcomes.

The process of application in itself may change the normal acoustic properties of a given material. While Table 1 gives a general idea of how common materials will perform under standard applications and conditions, a change in these conditions can result in a very different acoustic performance by any given material. There are several typical changes in application that can create the most difference in performance, as shown in the previous figure. While not all of these types can be applied to every material, these are the most common conditions that will result in a change in the acoustical quality or performance.

The largest factor in these differences tends to be the way in which a material is physically attached to the structure. This can range from near-independence from the structural components, such as being suspended or lightly clipped, to a firm, full attachment across the entire area of the material. The more independent the application of the material, the more likely it is to vibrate, thereby using some of the energy from the sound waves and acting as a more absorbent material.

An increase in the porosity of a material – such as introducing holes – will also increase its absorption, whether by acting on the scale of the material itself or on a larger scale, as a Helmholtz resonator does. A related quality is how far each portion of the material is placed from the next, such as a series of slats or a grille.

The more closely spaced the slats are, the more reflective and less absorptive the material becomes. This is especially the case for hard, smooth materials such as wood or metal. The relative thickness of the material may change its absorptive qualities (generally increasing the effectiveness of an absorptive

material) as well as its degree of transmission (a thicker material is less likely to transmit sound wave energy).

The actual surface of the material also makes a difference; the relative roughness of a material directly relates to its reflective qualities. While some of the roughness is innate, materials that can be formed or carved, such as stone and concrete, may have a wide variety of reflectiveness based on their finishes. Some acoustic materials, such as quadratic diffusers, rely on this quality, especially as it relates to the range of potentially reflecting sounds. The overall shape of the material is closely connected to this quality and also similarly relates to its reflective properties; for example, a concave or convex surface will reflect sound in a specific manner (concentrating or spreading the reflections, respectively) that differs from the reaction of the material as a flat surface. This therefore ties the material to the physical form of the space; these two are used in combination to create its actual acoustic properties.

A catalog of materials is included (Tables 1 and 2). This catalog lists both common building materials (noting the differences between them in overall acoustics as well as how they may alter other materials' performances) as well as specialized acoustically-oriented materials and other finishes. Each material's general properties, especially the three main acoustic properties (absorption, transmission, reflection type) and typical applications, are listed along with their general effect on the acoustic environment. This catalog is then used as a basic document from which each applied material is selected, chosen according




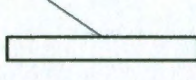


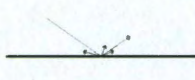
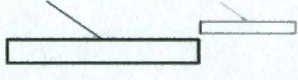



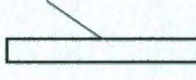



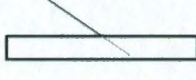
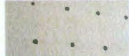


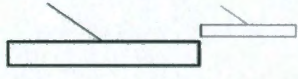


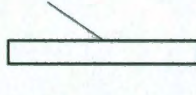


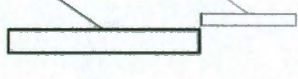
	Material	Attenuation	Reflection	Absorption
	Brick			
	Concrete			
	Glass			
	Gypsum board			
	Plaster			
	Resilient tile	<i>depends on below-surface material</i>		
	Steel decking	<i>depends on total mass of deck and topping</i>		

Table 1.1: Common building materials and their acoustic attributes under normal conditions. Small icons indicate other common versions.


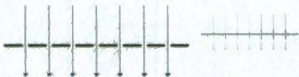

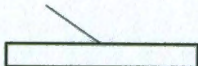



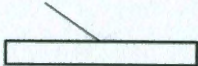

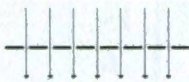

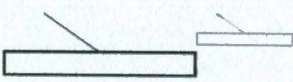

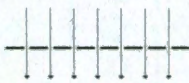

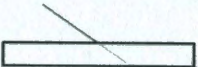



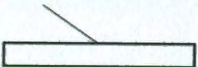
	Material	Attenuation	Reflection	Absorption
	Steel joists/trusses		 <i>if left exposed</i>	
	Stone	<i>depends mainly on mass and sealing</i> 		
	Wood decking			
	Wood paneling			
	Wood studs/joists		 <i>if left exposed</i>	

Table 1.2: Common building materials, cont.


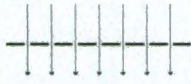

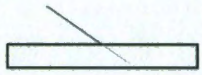

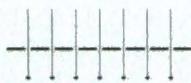

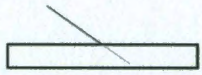

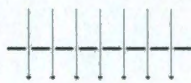

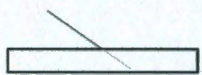
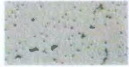
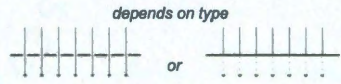

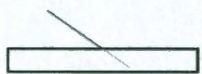

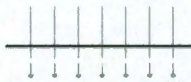

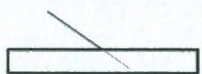



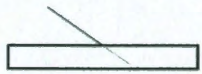



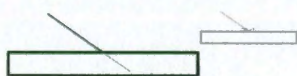
	Material	Attenuation	Reflection	Absorption
	Acoustical deck			
	Acoustical foam			 <i>depends on thickness</i>
	Acoustical plaster			 <i>(non-reliable)</i>
	Acoustical tile	<i>depends on type</i> 		 <i>depends on thickness</i>
	Carpet	 <i>(mainly impact sounds)</i>		
	Cellulose fiber			
	Curtains and fabrics			 <i>depends on thickness/heaviness</i>

Table 2.1: Acoustic-specific building materials and their common attributes.


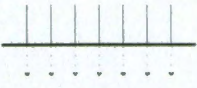





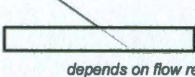

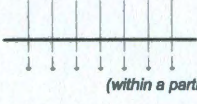
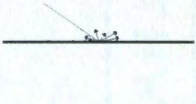
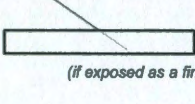



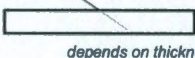

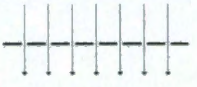

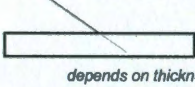



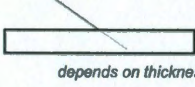

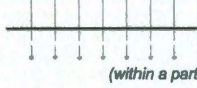

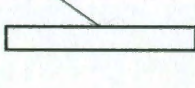
	Material	Attenuation	Reflection	Absorption
	Duct lining			
	Fiberglass			 <i>depends on flow resistance</i>
	Fibrous batts/blankets	 <i>(within a partition only)</i>		 <i>(if exposed as a finish)</i>
	Fibrous board			 <i>depends on thickness</i>
	Fibrous plank			 <i>depends on thickness</i>
	Fibrous spray			 <i>depends on thickness, application</i>
	Loose insulation	 <i>(within a partition only)</i>		

Table 2.2: Acoustic-specific materials, cont.




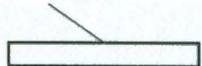



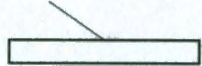

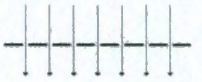




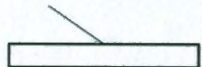

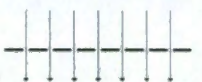
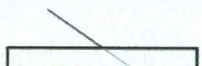
	Material	Attenuation	Reflection	Absorption
	Laminated glass	 (compared to monolithic)		
	Lead sheet			
	Metal pans			 depends on perforations and backing
	Sealants	increases attenuation of other materials		
	Slats and grilles		may be reflective if increased in size and space is reduced between them	 depends on size of slats and spacing, and backing material

Table 2.3: Acoustic-specific materials, cont.

to its impact on existing materials as well as how it might modify the inherent acoustical properties of the form of each space. These choices are made concurrently with those based on form, creating a synthesis of these two lines of research in order to create the needed variety of acoustic environments. While finishes and some of the specific acoustic materials may be altered or completely substituted in the final design, even by the occupants well after the building is completed, most decisions that are tied directly to this interplay of form and material will remain stable (such as the choice of basic structural materials and the way a final finish will be attached to these structures).

In this case, concrete was chosen as the basic structure (Figs. 15-17), allowing for the necessary variety of forms suggested in the form-based branch of this research. Additionally, the choice of concrete meant that individual rooms could be made more isolated if necessary, due to the low transmissive qualities of this particular material, meaning the interconnected quality of the institution will be as flexible as possible. A secondary choice of creating a system of double doors increases this flexibility by allowing a number of possible states to occur given a set of circumstances. The double-door mechanism, made of heavy acoustic doors, an “airlock,” and magnetic closures, allows three different modes of operation: completely closed (creating isolation), half-closed (allowing some transmission, but not complete overlap), and entirely open (allowing fully overlapping sounds and merging two otherwise independent spaces). Together, the choice of fundamental structure and the ability to open and close boundaries

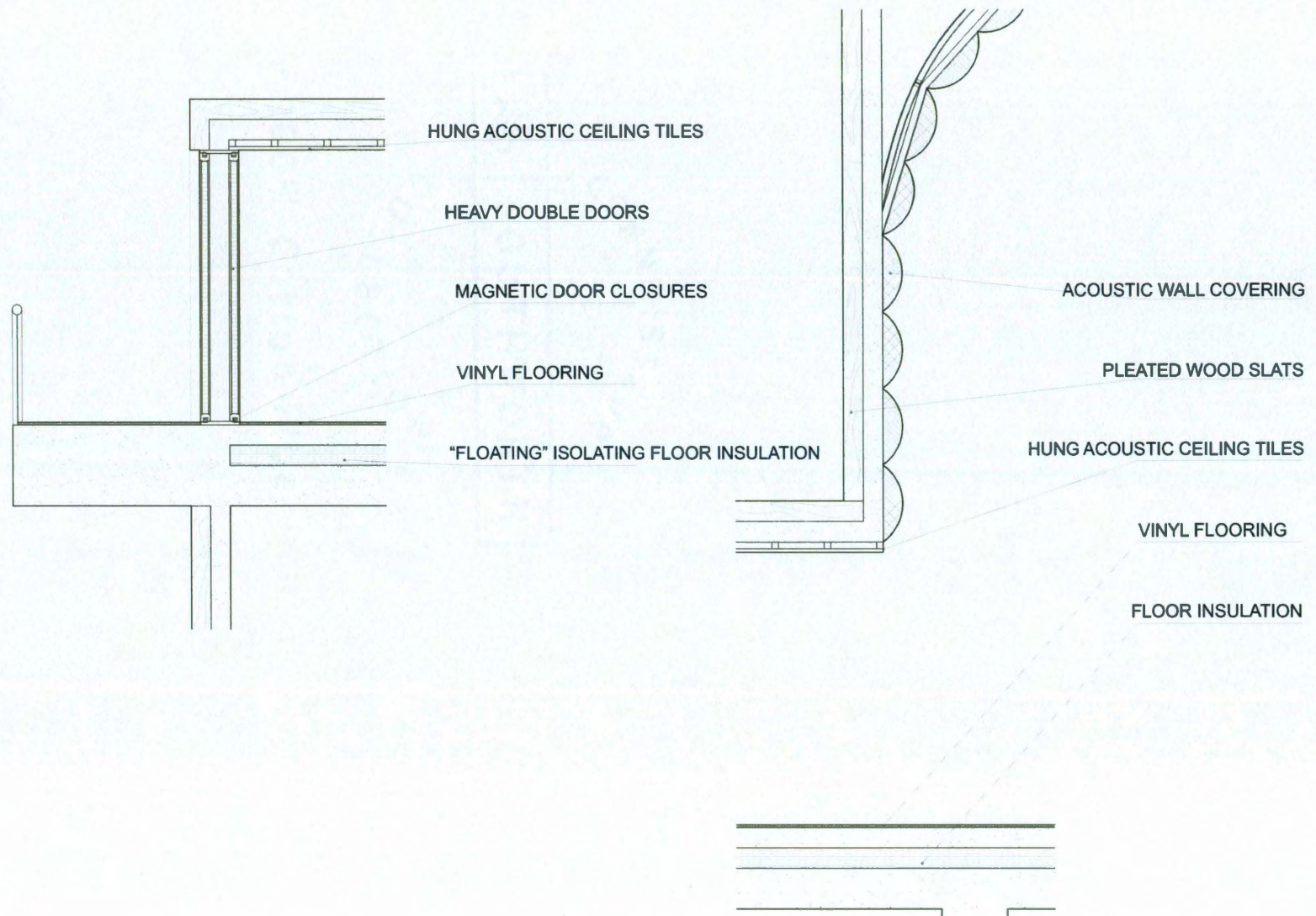


Figure 15: Detail sections. Double-door mechanism (left) and padded wall and ceiling for rehearsal/performance hall (right).

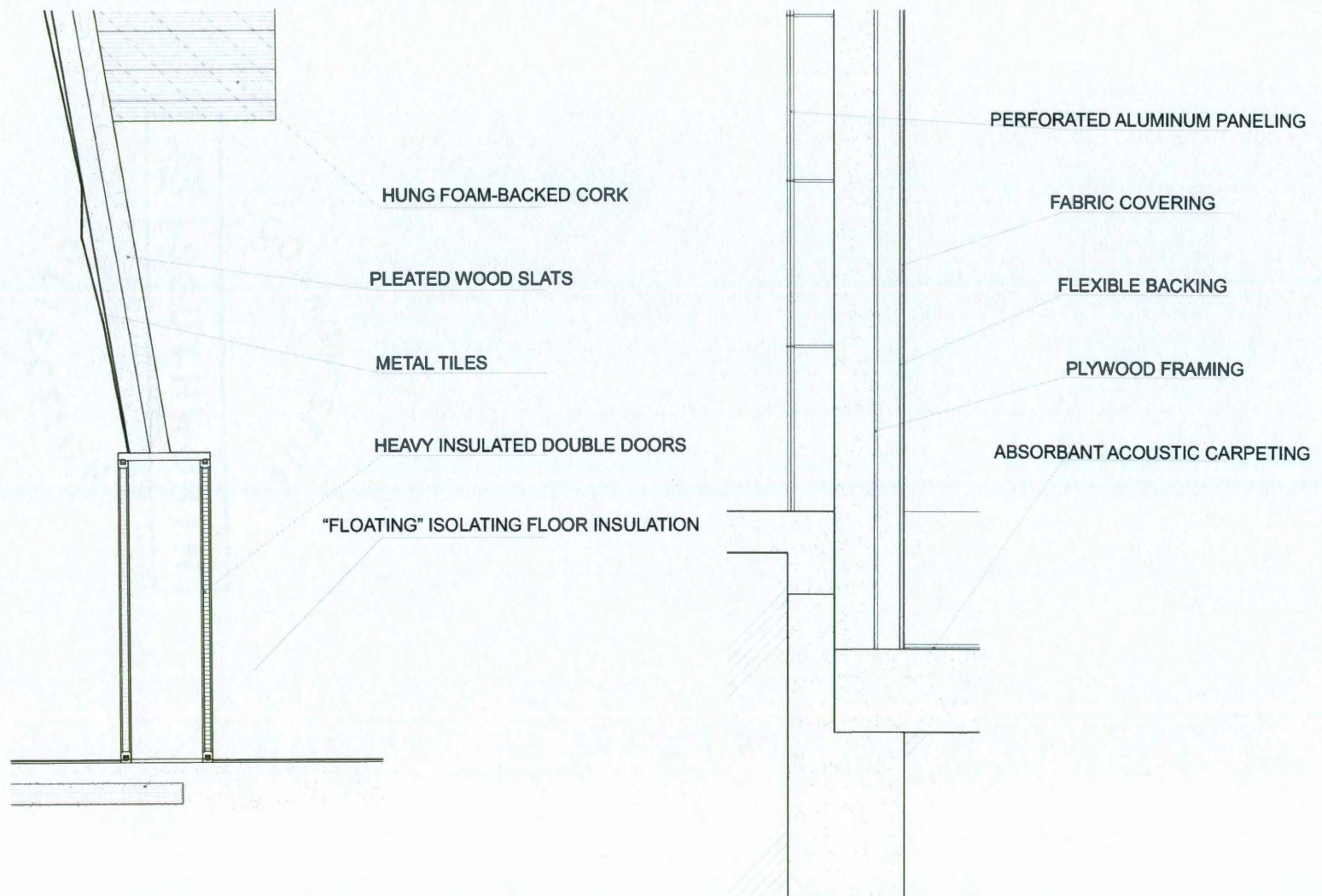


Figure 16: Detail sections. Rehearsal/performance hall and instrument chamber (left) and ground-floor hall with polycylindrical elements (right). 8

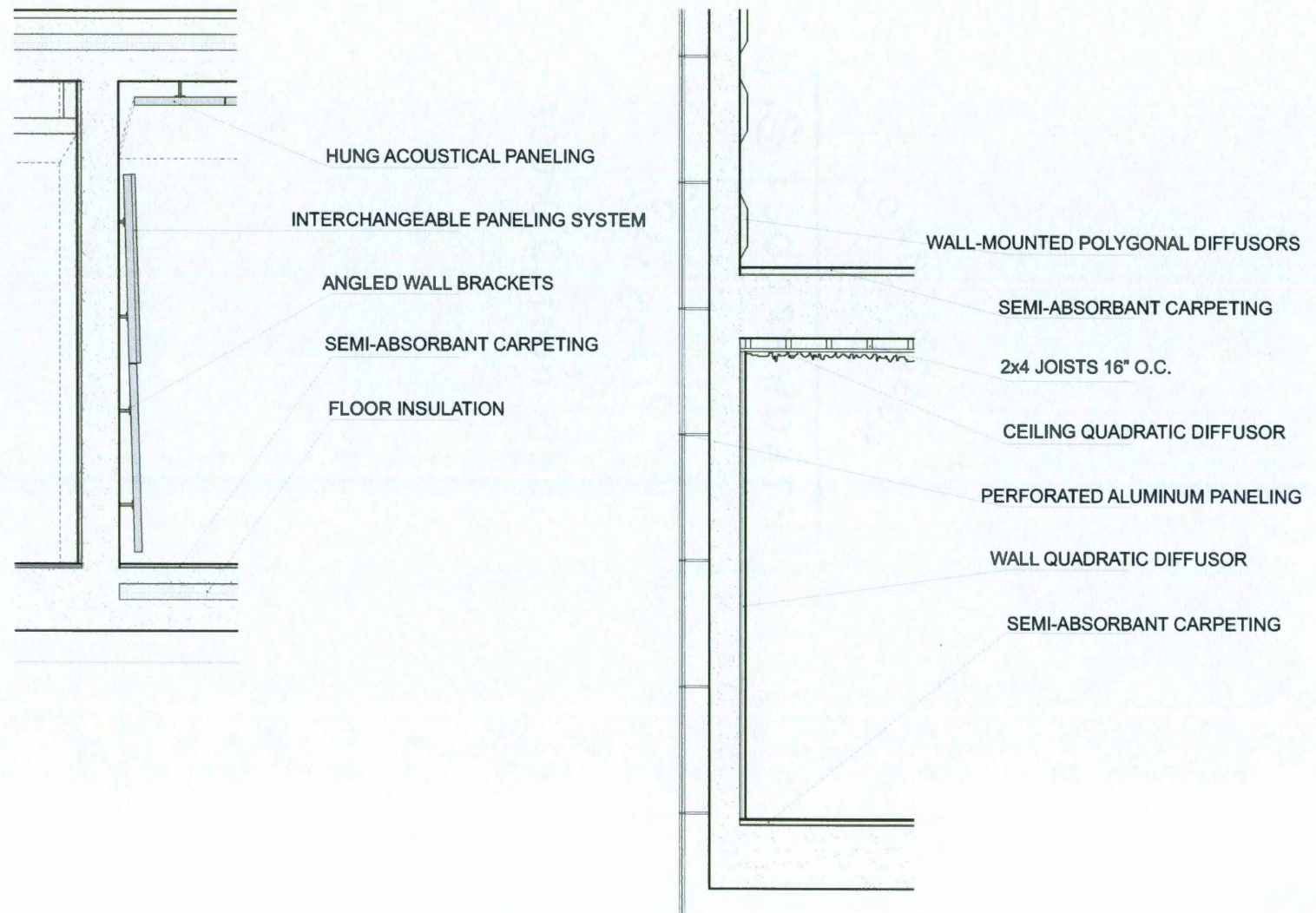


Figure 17: Detail sections. Offices with interchangeable panel system (left) and practice rooms with two modes of sound control (right).

in internal spaces creates a highly flexible system that can work well in a variety of scenarios.

The sets of individual spaces are each treated as simultaneous decisions of both form and material. This is particularly the case for the largest programs, especially the rehearsal/performance halls. Because each hall is considered as a wholly different “type,” meaning the set of halls together caters to a wide variety of performances, the material choices are taken together. Here the most important properties include absorption and reflection type; together with form information such as volume and angles, these materials describe and create specific sets of acoustic environments, discussed later. In the case of the smaller rooms, such as practice and ensemble rooms, form is generally given the greater consideration because of the rule of volumes; materials, while important, are secondary and are also considered replaceable. In this case, they act as a final finish that can greatly change each room’s individual character, further widening the variety of potential environments. Materials here were chosen for their absorptive and reflective/diffusive qualities; devices such as the quadratic diffusor and acoustic wall panelings work well in such spaces and can easily be adjusted to create different acoustic qualities. The offices, although similar in scale to the smaller practice rooms, are considered a different case; each must respond to the individual desires of their respective main occupant, rather than acting as a single ideal form. A system of interchangeable panels is devised to adapt to these different expectations; these panels are based on existing acoustic

treatments that are currently used to modify poor-quality acoustic environments.

Each 2' panel is mounted to the wall at an angle to reduce flutter echoes; these panels have differing levels of absorption and reflection/diffusion and can be mixed to produce highly individualized results. Both side walls and the ceiling can be treated with these panels, and can be changed by the occupant as necessary. These changeable environments account for the use of the offices as private lesson areas, as well as acting as typical office spaces, though ones that also must take into account the sound-based qualities of teaching at a conservatory.

Form Research

The actual form of a given space plays a large role in its acoustic “feel” or aural perception. While the complexity of how sound operates in an environment limits the current understanding of exact forms and their resulting sound conditions, there are general rules that guide potential designs. The actual volume of space inside a room has a large impact on its acoustic qualities. Its effects include the relative perceived loudness of sound; its warmth; the envelopment and openness of the room’s sound; and its relative dryness (or reverberation time). The actual shape this volume takes also contributes to these factors, especially in regard to where the audience is located in comparison to the sound source, as well as the height of the ceiling and the narrowness of opposing walls (Figs. 18-20).

Additionally, the angles that the walls take in relation to each other have an increasing importance as the volume of the room decreases. Parallel walls cause flutter echoes, essentially quick back-and-forth bounces of the sound that can be

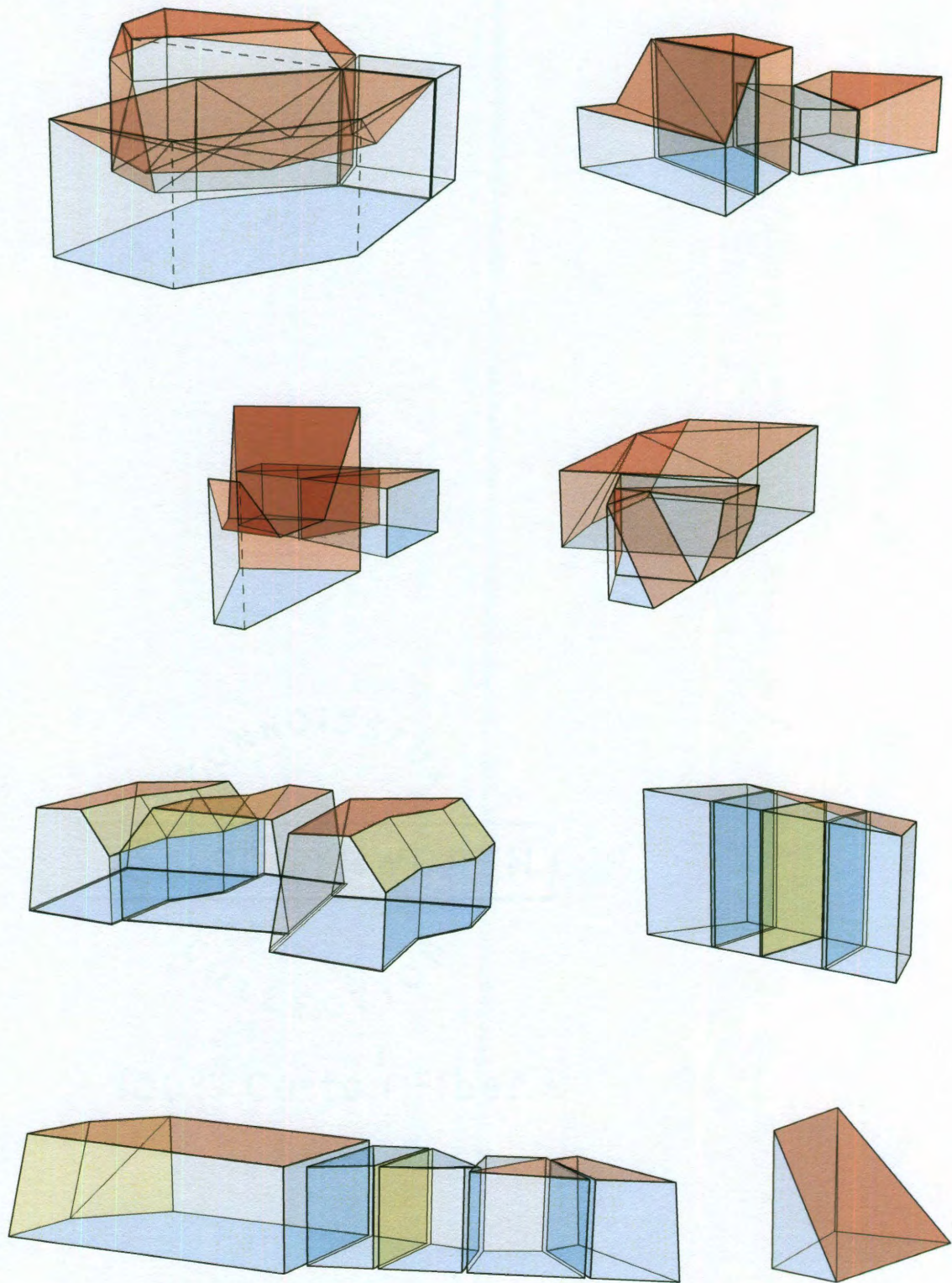
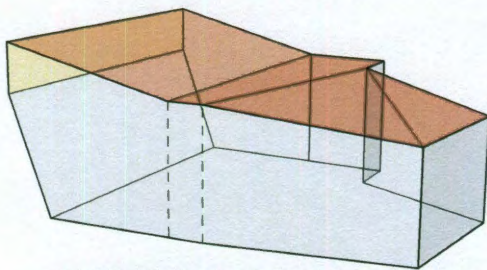
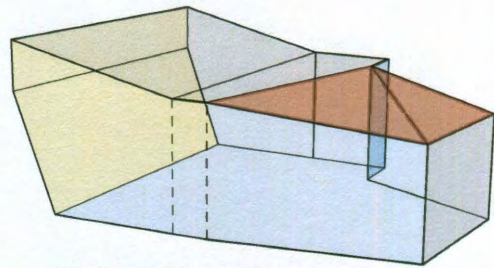


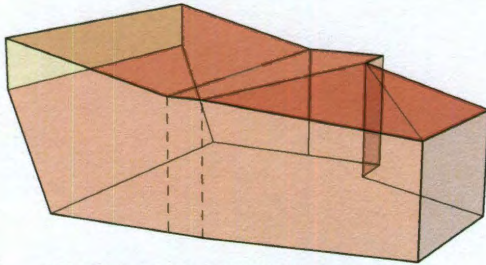
Figure 18: Collection of potential small-element program forms, with colorings indicative of possible material applications (blue - absorptive, green - transmissive, red - reflective).



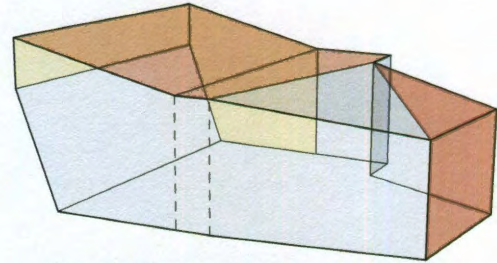
neutral materiality with typical reflective ceiling; plus some transmissive material facing Peachtree



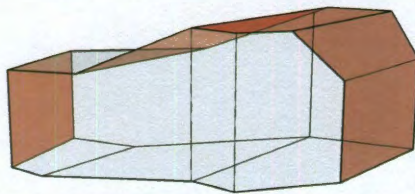
highly absorptive room with minimal ceiling reflection, large transmissive area facing Peachtree



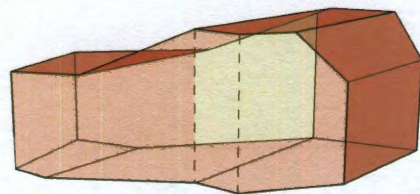
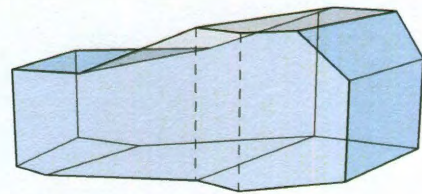
highly reflective room with some transmission to Peachtree



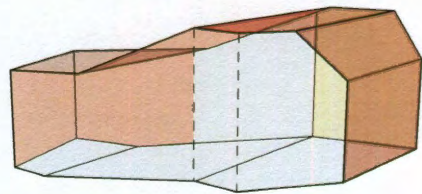
mixed materials: transmissive toward the cross streets, reflective ceiling and back (front) wall, absorptive at the stairwell, neutral floor and walls



mainly neutral with typical ceiling and front/back reflection

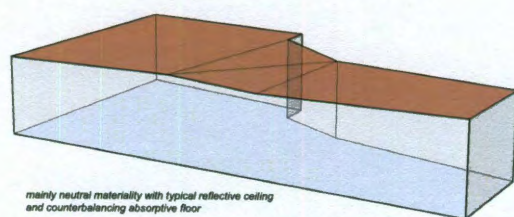


almost entirely reflective, with partial transmissive wall toward secondary street

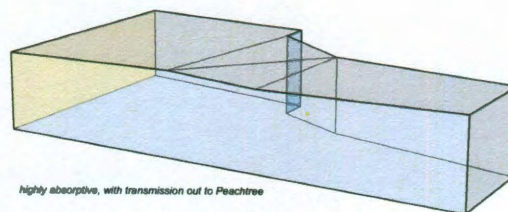


mixed-materials: reflective ceiling and some walls, partially transmissive to street

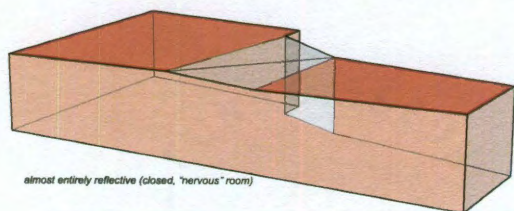
Figure 19: Possible material applications to specific rehearsal-hall forms. Top: largest rehearsal hall, facing toward street. Bottom: Smallest rehearsal hall, interior of building.



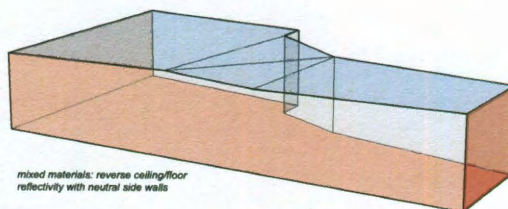
mainly neutral materiality with typical reflective ceiling and counterbalancing absorptive floor



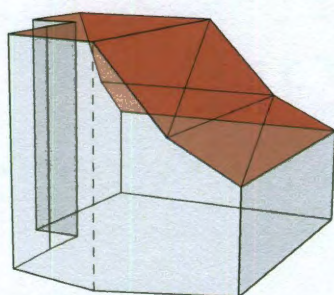
highly absorptive, with transmission out to Peachtree



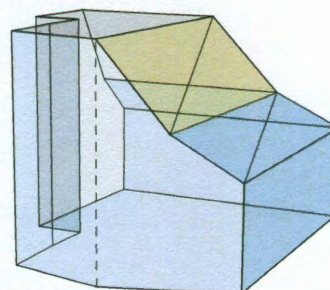
almost entirely reflective (closed, 'nervous' room)



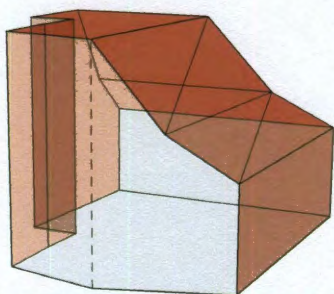
mixed materials: reverse ceiling/floor reflectivity with neutral side walls



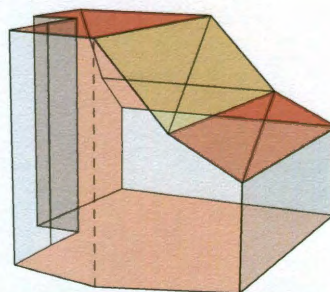
mainly neutral with typical reflective ceiling



mainly absorptive with some transmission out to the city



highly reflective with neutral flooring and some walls



mixed materials: reflective floor and ceiling, with some neutral and absorptive walls to counterbalance; some transmission out to city

Figure 20: Rehearsal/performance hall forms and material explorations, cont.

heard by the listener, which decreases the quality of the performance. In wider and larger rooms, these echoes decrease and are usually overshadowed by other effects; they also fade in a shorter amount of time, as the sound energy has further to travel. Smaller practice and ensemble rooms, classrooms, and offices are most affected by flutter echoes, although larger rehearsal and performance halls, especially narrower ones, may also experience this phenomenon. Slightly angled walls and ceilings will generally do away with these effects.

Walls angled differently from standard 90-degree corners begin to have a further effect on the actual sound of the room. These angled walls begin to direct or channel sound; a room that is narrow at one end and wider at the other will have two opposing acoustic types and may direct sound from the narrower to the larger end, as a funnel. Larger rooms of this type begin to function as a typical chamber room, the fan shape. Many different angles within one room can have the effect of widely dispersing the sound and its energy, creating a more enveloping experience, especially if those angles are treated with highly reflective material. These kinds of rooms may have widely varying auditory effects depending on where both the performer and the audience is standing, allowing for multiple experiences to occur within a smaller number of rooms, as long as these effects are carefully controlled rather than scattered and overwhelming.

The types of forms investigated are focused specifically on the areas of performance, on which form has the greatest impact. These areas include the central space (instrument chamber), the main rehearsal/performance halls and

areas, the practice and ensemble rooms (which also function as classrooms), and the offices (which are used for private lessons as well as for more typical functions). Each of these functions has a different set of requirements, as well as historical precedents, that define expected forms. This is especially true of areas used for performances and rehearsals.

Performance spaces, both interior and exterior, are rooted in the history of music and its performance back to ancient times. Spatial archetypes have evolved out of these centuries of music and its practice; these continue to be employed today, and here provide a platform to determine the basic shapes of the experimental conservatory's performance areas. These basic shapes can then be manipulated in the service of cultivating experimental sounds and providing appropriate spaces for the conservatory's performance needs. Given the four approximate sizes chosen for the rehearsal halls, plus the idea of an outdoor performance area, several appropriate types can be chosen as applicable candidates for these experiments.

Outdoor performance areas are generally one of two types: the amphitheater type, which is fully open, and the shed type, which is semi-open. The amphitheater type has its roots in ancient times; some of the best examples are from the Greeks and Romans, and were generally used for spoken-word performances. Generally, these theaters have a circular or semi-circular performing area at the bottom, with surrounding tiers of seating rising above. The shed-type space is commonly built for modern-day outdoor music performances;

the Tanglewood shed, built for Boston's symphony, is a notable example. These⁴⁷ are covered to some extent, but lack side walls. In some cases, the entire stage and seating area is covered, while other sheds only cover the stage to varying extents. Nearly every shed-type has a back wall, bouncing sound back toward the audience to provide early reflections for better acoustic performance; seating is often flat rather than sloped, although a slight angle is often used for larger audience areas. The outdoor performance areas in the experimental conservatory take cues from both these historical models. The performance space at the front of the building consists mainly of tiered seating, which doubles as a public gathering area when no events are occurring. This seating, with a quasi-circular depression at the bottom, is similar to the amphitheater style with a relatively steeply raking slope, although its shape is contorted to fit the site as well as angle this public space towards the High Museum plaza. The performing area is instead similar to the shed-type halls; its reflective back wall and protective overhang, as well as the raised stage, are taken from typical shed design. The terraced roof's performance spaces are also a mix of these two typologies, although the amphitheater type is more prominent due to a lack of protective overhangs and rear walls.

Other historical examples also influence the choices made for interior performing areas. The smallest spaces are linked back to chamber halls, which were initially simply rooms in private houses (and especially palaces) dedicated to the performance and practice of music. Over time, these rooms – which tended to

be well-proportioned, rectangular, with a somewhat high ceiling – became the one of the standard shapes built for the performance of music – the “shoebox” chamber hall. New performance spaces were often built as closely as possible to existing successful theaters and halls, resulting in stereotypical typologies and some refinement of proportions. A similar type, only somewhat altered in shape, was the “fan” hall; these were flared in floor plan, with the expectation of the performing group in the smaller end with the audience seated in the larger end. With the addition of design techniques such as sight lines – ensuring each seat in the audience could see the performers, which generally also meant that the occupant could hear them as well – these shapes evolved into many of the performance halls built in the 19th and 20th centuries. Opera houses, evolving from indoor theater types, eventually created a third typology of the “horseshoe,” with a tall, circular seating area nearly walled off from the low, deeply set-back stage.

Other forms also historically affected the design of performance-hall norms and continue to influence some of the design choices in this experimental conservatory. Churches, especially large basilicas, had a major impact on the performance and form of music and its composition. Although many of the principles of design used in larger churches were ignored in classical performance-hall design, some influences remained; notably, these included ornamentation that was considered critical for good acoustics, such as statuary and columns. The long reverberation time and high reflectivity of many church

interiors, stemming from both their forms and their material choices, continues to create an interesting environment for creating new music and therefore offers some suggestions for some of the interior performance halls, in particular the tallest hall designed to have a large amount of reverberation.

While not as rooted in a long history, practice and ensemble rooms nevertheless have an established set of types to which they are expected to conform. The prevalence of cookie-cutter practice rooms, in particular the movable/modular type, has led to the assumption of very small, rectangular-footprint rooms with highly dampened acoustics, even in conservatories with permanent practice facilities. These environments tend to be highly idealized and repetitive – every practice room a clone of its neighbors – with few exceptions. Not only does this discourage inventiveness and creativity in practice, it also privileges some instruments and types of performance (by providing them with more useful environments) while providing substandard spaces for others. Part of the drive at this new conservatory is to eliminate this repetition, providing a wide range of practice and performance areas rather than a highly limited subset. This is accomplished through both form and material application; form itself provides the foundation for these new environments. Both a study of practice/ensemble room types and a basic understanding of small-room acoustics resulted in a set of rules, which were then used to determine the actual forms of these rooms.

Four rules govern these basic forms:

- 1- A larger-than-normal volume is ideal; small footprints are paired with tall ceilings and vice versa
- 2- Parallel walls are avoided because of flutter-echo
- 3- Smaller footprints have more proportionally even sides to limit over-funneling sound
- 4- Angled walls and ceilings tend to direct sounds

The smallest practice rooms are considered as a group rather than being formed on an individual basis. In addition to the above basic rules, these spaces are also presumed to fill in any excess space between the instrument chamber and any larger programs already designed. These rooms therefore have some variation based in part on these exterior requirements (Fig. 21). This essentially broadens the possible room configurations and increases the variety of forms while allowing these groups of spaces to work with the larger whole more readily. The actual mechanism of dividing these rooms is fairly straightforward. Given a certain area needed to fill, and a general outline of both the number of spaces needed and an approximate square footage requirement, this area is first evenly divided, keeping the four basic rules in mind. Awkwardly angled rooms, generally those between two of the larger programs, are generally widened into larger ensemble spaces to avoid overly difficult acoustic environments. The even divisions are then angled slightly to avoid parallelism; these divisions are thickened into walls, with each room given a slightly different individual character

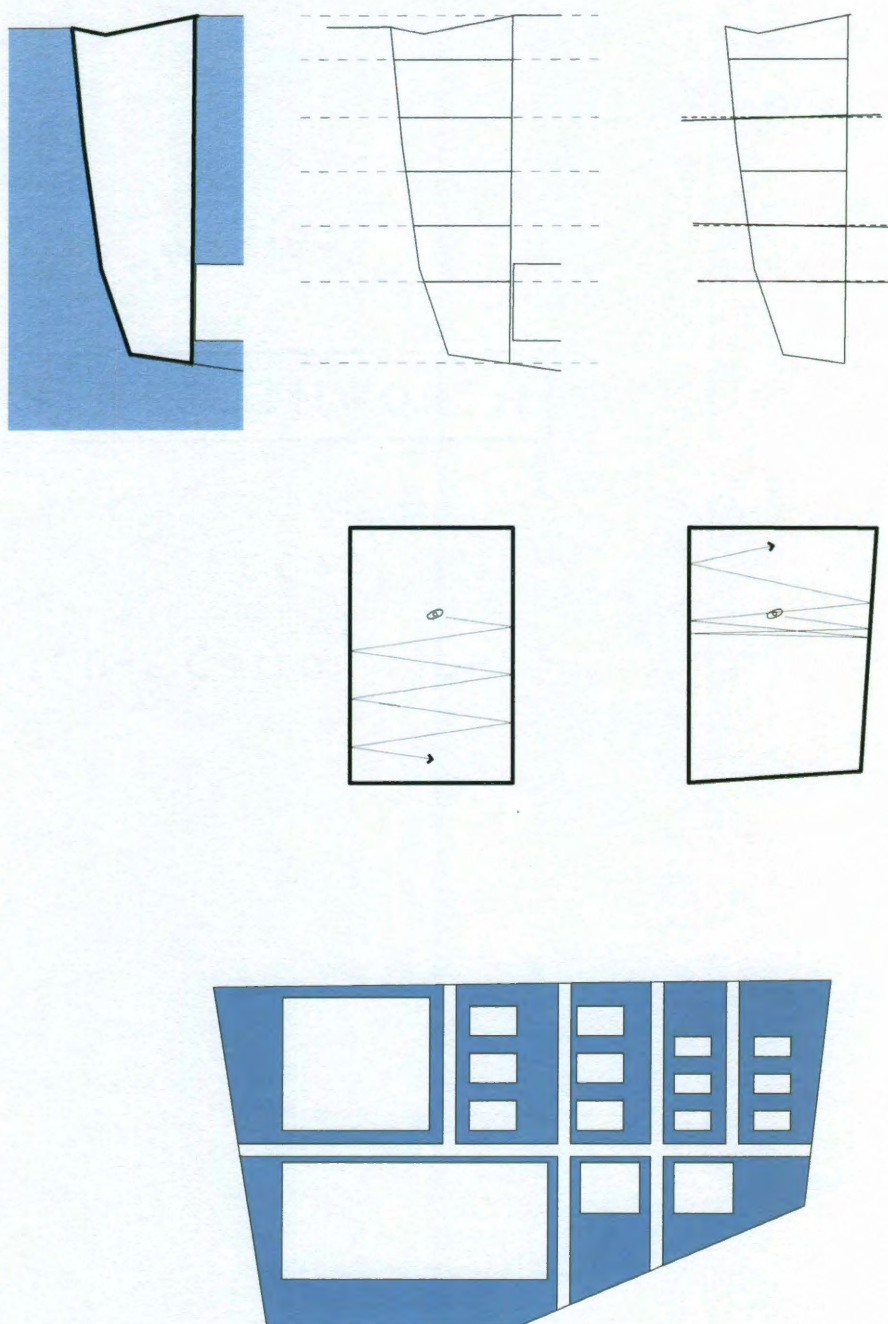


Figure 21: The four main rules of the smallest programs are especially important with small-footprint elements. Both the method of division and the importance of non-parallel walls are highlighted here.

that can then be heightened through the use of specific materials, chosen through the material catalog. Generally, these materials are acoustic in nature, giving each room a different environment according to each chosen type. These environments can be typical, such as a semi- or completely absorptive practice room, or atypical, such as a highly reflective ensemble room. Some of them are also designed in pairs, applying transmissive materials to their mutual wall to provide a purposeful overlap of sounds generated in those rooms. Most of these effects are combinations of both form and material; however, each room may be altered as needed by changing its finish.

These rules also have an effect on the forms of the offices to some degree, due to the practice of having private lessons there as well as acting as normal faculty office rooms. Although most of the acoustic properties of the rooms are governed by their materials – given that these offices are equipped with an interchangeable panel system customizable by each occupant – both the basic volumetric shape and the placement of the walls create a base environment out of which more specific circumstances emerge. The purposeful angling of the walls (which additionally serves to direct sounds during lessons) allows the offices to nestle into each other and form pockets that work well for office use while also reducing the overall space taken up by a given set of rooms. Together with the volumetric rule, the angles in these walls suggest the need for a sloped ceiling that balances the proportions within each room, which is accomplished both in the basic form of the room and in the materials applied to it. These rules, combined with the desire

to group offices together, create a set of two basic office types, which nestle together and then can be repeated as necessary.

Conservatory as Field: Interconnection, Thresholds, & Public Space

One particularly important aspect of the experimental conservatory, aside from the inclusion of a wide variety of acoustic environments that support the kind of sound cultivation needed for this kind of music, is the idea of the institution as a larger whole composed of interconnected parts, rather than as a series of independent spaces that are then strung together. This additionally expands into the necessity of the conservatory to connect back into its social and architectural context – a wider-ranging version of this part-and-whole construct. The concept of a “sound field,” both in the conservatory as a building and in the city, is particularly useful in this case. No sound can be considered independent or acting without influences, nor do sounds have defined edges beyond unusual circumstances such as vacuums; rather, sounds tend to overlap, merge, fade, and otherwise act in a complex manner with other existing sounds. Like light, sound intensity follows the law of inverse proportions, creating “fuzzy” edges rather than clear boundaries. Together, these tendencies create a widely interconnected system, or field, of sounds, one that is both intricate and ever-changing. A city has its own set of sound fields; the conservatory has to fit into that field and, because it is a sound-based program, must recognize and adjust its own sounds to work well within it. Additionally, the school creates its own smaller sound field – especially when each part within the school is

interconnected rather than independent. The cultivation that occurs within the school relies on this field of sound to produce new and unexpected effects, overlaps, and potentials; the concept of the school as a whole is as important as each individual room being suited to experimentation.

The interconnectedness of the conservatory into the city's sound field increases its existing importance in the public sector and enhances its prominence as part of the culture of the city. Public involvement and education is therefore given an increased importance in the program of the conservatory, greater than is usually seen in typical or traditional schools of music. Given that the institution is engaged as part of the city's sound field – therefore not acting as an island of sound creation, but rather as a part of a greater whole – a kind of porosity is expected of the building and its programmatic implications. Public involvement is not limited to acting as a passive audience for performances, but rather expected as part of daily interactions and operations – becoming part of compositions, practices, and performances as they enter into the building. The actual design of the building itself therefore must be much more open in nature than most typical conservatories, allowing the public to enter through all levels and potentially be involved in the entire process from composition to performance. Design must not create a wall or an island, but instead a porous object-field that encourages both student and public occupants to flow throughout the entire building.

The idea of thresholds and gradients of occupiable space plays a large role in the inner workings of the conservatory building. The inclusion of public space

infused throughout the interior of the building, in addition to its inherent interconnectedness, naturally degrades the privacy that might otherwise be expected from an educational institution, necessitating a different approach towards the separation of “private” and “public” spaces. Rather than completely separating these two, as a traditional conservatory’s program would dictate, the solution here is to offer a series of invisible thresholds that guide different occupants’ circulation choices. Although the school is entirely open, meaning each room is accessible through the main circulatory space, subtle design choices suggest different kinds of spaces, creating a self-regulating system of circulation that differentiates its users. A relatively simple set of design choices guides this system: the interior shape of the circulation space (mostly determined by its sound-based requirements); the placement of the main vertical circulation elements; the placement of the more public areas in relationship to these elements and to more private areas; and the placement of other attracting elements that change circulation patterns. In this case, nearly every attracting element, including the main vertical circulation routes, are placed in the center of the building’s circulation space (Fig. 22); simultaneously, this circulation space is widened in this area to accommodate additional occupants. Most of the main spaces of public interest – in particular, the rehearsal/performance halls and the spaces most likely to be used as additional performance areas – are immediately accessible from this widened area. Most public circulation, therefore, will be limited to this central space in the upper floors, which are therefore automatically made more private than the lower floors with more widely-dispersed circulation

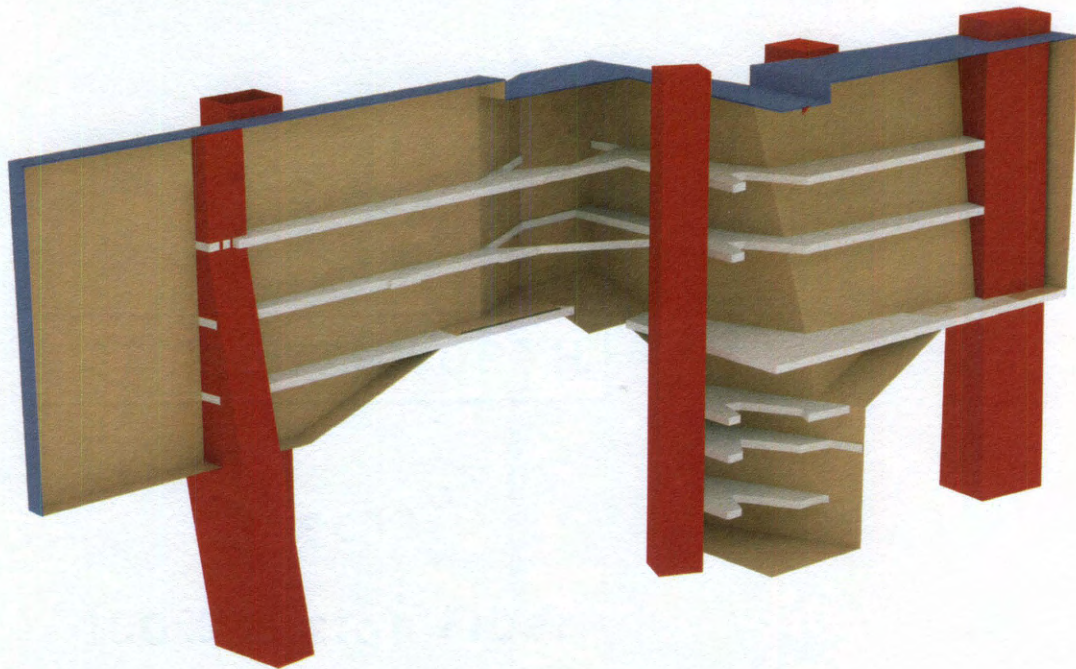


Figure 22: The overall form of the instrument chamber is created first, and remains a whole collective space; it is also divided, although not completely separated into smaller spaces, by the vertical circulation elements as well as the floorplates that act as interrupting figures.

paths, which ultimately creates a self-regulating system that allows more physical and auditory openness in the conservatory without disrupting most day-to-day educational uses of the institution.

The Experimental Music Conservatory

Although generally related to the traditional idea of classical music in its expressions, experimental music takes the principles of musical composition and performance to a level beyond typical instrumental works. While traditional music tends to use a limited set of sounds that are considered to be pleasant, and generally organizes them in a predictable way, experimental music expands the field to include nearly any sound, including what would typically be considered noise and other distracting elements, overlapping them and combining them in new and often unlikely ways. These techniques require flexibility in the built environment, not only to perform but to compose, practice, and otherwise create works using them. Because traditional conservatories tend to be rigid and formal in design, they are not often useful environments for experimental music. A conservatory designed for nontraditional uses is necessarily different in its considerations of factors and their relative importance. This includes the eschewing of standard ideas of proper environments used for developing sound, in particular the way in which spaces and sounds are separated from one another. The ideas of disparate layering, cacophony, and confusion, which are downplayed or avoided in traditional music-building design, are here celebrated as opportunities to understand the principles of new music types and experiences. These opportunities are actually created through the design of the building itself – the architectural understanding of the way in which experimental music is composed and processed through education.

Poché space and its potential uses are the key factors in the design of music conservatories and other educational and performance facilities. In traditional conservatory and performance space design, a thick poché is generally used as a mechanism for separating individual rooms, rendering them independent and essentially specialized spaces, both in design and in acoustics. This poché is essentially a dividing mechanism, using thick walls and hallways to break up the usable spaces within the program of the conservatory. Although the actual program of the spaces re-integrates them to some degree, through a thin network of use by the students, instructors, and audience, they essentially act as small stand-alone pieces floating in the larger “dead space” of the poché. While this is useful for traditional music – in that the use of one space will not affect or influence the use of another – this kind of rigid separation tends to stifle the creativity, flexibility, and innovation associated with the kinds of sounds and compositions produced by experimental musicians and composers. Overlapping sounds, noises, and other events that are usually considered negative aspects in traditional conservatories can instead be seen as positives – potentials for making new combinations via the mechanism of the physical environment – in the case of experimental music. The poché space is then transformed into a collective space of unification, rather than one of division.

The newly recalibrated poché space therefore becomes the central design and motivation of the conservatory. Acting as the main circulation corridor, it connects every room across the entire building. It also functions as a public

space, allowing the flow of people from the High Museum and other buildings in the district through the space – both across its length and through its height – which encourages public engagement, both in the form of an audience and as participants in composition and performance. The building behaves as a porous object in the landscape of the city, both aurally and via the general public, educating not only its students but also the city's occupants through its performances and day-to-day operation.

The Program of the Conservatory

The new experimental conservatory is similar to traditional conservatories in many ways: it contains spaces for practice and performance as well as offices, a music library, a recording space, and storage. It is the relationship of these pieces to each other, as well as the addition of a central public space, that begins to differentiate it as an experimental program.

The conservatory is expected to have a small enrollment, around 100-150 students depending on the actual use of the space. Having a wide variety of potential performance spaces is key, and because these spaces are combined with the largest rehearsal halls, the conservatory's total space is oversized in comparison to its enrollment; the total area, including circulation, is approximately 90,000 square feet. There are four rehearsal/performance spaces, each of a different size and type, plus an additional outdoor performance area at the entrance and more flexible performance space on the terraced roof. The four main halls are approximately 2400, 2500, 7500, and 9000 square feet,

respectively. There are 15 small practice rooms of varying size (averaging approximately 75 square feet), as well as three larger ensemble rooms of about 325 square feet. Additionally, there are five rooms of approximately 160 square feet and three of about 750 square feet, which function both as active classrooms and teaching studios for larger classes and ensembles.

There are also quiet areas, which are separated from the more active rooms via threshold zones and heavier enclosures. These include the large music library of about 8,000 square feet; three listening and composition labs, of about 800-850 square feet; five “quiet” classrooms for academic purposes, of about 130 square feet each; and a recording studio, set off from the main body of the building, at approximately 195 square feet. There are also offices, which can accommodate both quiet and noisier programs depending on the occupants’ preferences, 15 at approximately 195 square feet each, which allows for both a traditional office use as well as functioning as spaces for private lessons.

There is a large amount of support and mechanical space, including storage and restrooms on each floor as well as both passenger and freight elevators, used for moving large instruments. A loading dock is also located on the ground floor to allow for traveling ensembles as well as the delivery and movement of large instruments and other equipment. The public areas are also relatively large; the circulation space allows the public to move through the entire building, including the roof terrace, and the entry provides a large public gathering space that doubles as a performance area. This public space is an important aspect of

the building and provides the mechanism through which the conservatory is designed.

Design and Function

After determining the best selection for the typologies of the larger programs (in particular the four main rehearsal/performance halls), these were arranged in a loose three-dimensional grid over the site. The poché space and circulation corridor was given the main design focus. It is meant to encourage the movement of sound, funneling the created energy from the exterior into the center. Acting like a musical instrument, this space has two “arms” that lead back to a larger central space, which acts both as the acoustic center of the building as well as the main body of the circulation. This poché space is intentionally made with pockets and nooks that enrich the sound as it travels, as well as encouraging players to find their own niche within this larger space, whether for practice, performance, or as material for inspiration. The jaggedness of the space calls to mind the interior workings of a complex instrument such as a horn or trumpet, and functions in a somewhat similar manner (Fig. 23).

Once this design forms the auditory and circulation – or “instrument” – space, the rest of the program is molded around it. The largest program spaces, already made into their respective volumes, are altered slightly to fit closely around the instrument space, thereby forming the basic volume of the building as a whole. The smaller program spaces, including the classrooms, practice and ensemble rooms, and offices, are formed through the division of the remaining space into

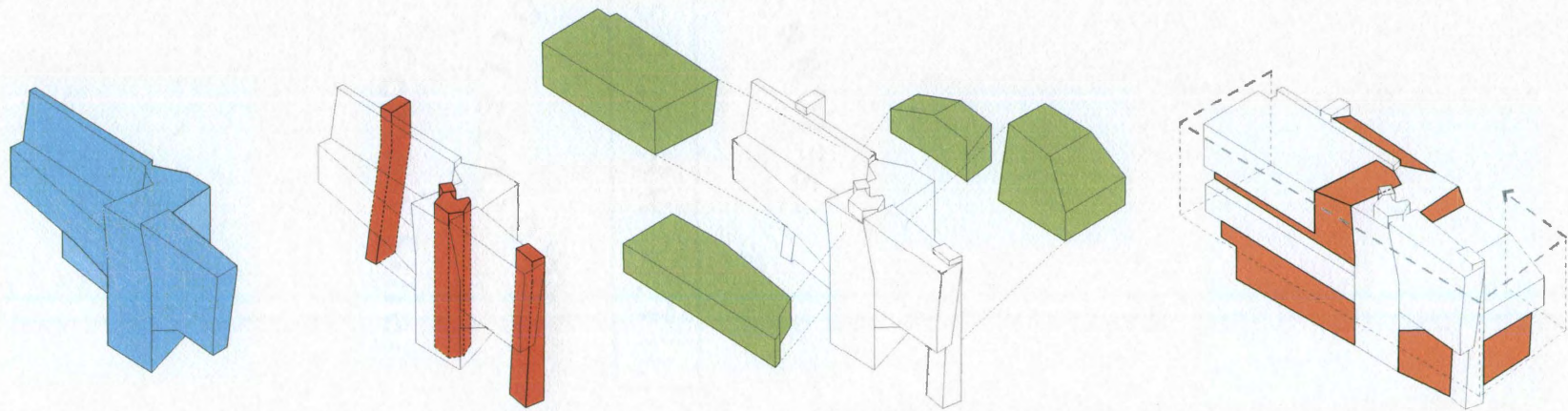


Figure 23: The method of design begins with creating the instrument chamber. This is then pierced by vertical circulation cores. The largest programs, already roughly estimated, are then molded around the chamber and circulation elements. The smallest programs take up any remaining space, while the exterior facade wraps around the building, muting its more visually striking forms in order to highlight the sounds generated by the school.



Figure 24: This panorama, including the proposed One Museum Place, showcases the new conservatory as a relatively quiet building, deferring visually to other public elements in the area such as the High Museum and the Woodruff Arts Center.

appropriate volumes through the application of the formal and material research.

These spaces form the whole configuration of the school, with the smallest programs acting as the “glue” that keeps the instrument chamber and the largest programs working together efficiently.

The programs are placed with an emphasis on allowing a variety of functions to be performed on each level, encouraging the mixing and discovery of different types and combinations of sounds. The most private programs – those needing a separation from the noise of the main body of the conservatory – are in the basement levels (Figs. 25 and 26). These include the music library, with an offshoot of the composition, computer, and listening labs, as well as the recording studio, which is additionally separated from the instrument space through a secondary threshold room, which can also serve as a storage area. The music library is formed in two levels as an open room with partially-separated spaces, to be used to divide collections and reading areas as necessary. The labs are accessible through the library, which itself acts as another threshold to keep these labs as quiet as possible. The entire basement area is set up to remain significantly less noisy than the ground and upper levels, although the instrument space allows both sounds and people to flow from the upper floors into the central part of the basement, connecting these spaces back to the main emphasis of the conservatory’s mission.

The ground floor (Fig. 27) is designed to encourage the flow of people, not only members of the school (students, faculty, and staff) and the audience during

performances, but also the general public while the school is open during its daily operations. The generous space given to the outdoor performance area is left open and welcoming, serving additionally as a place for public gathering. It is angled toward the public areas of the High Museum and the Arts Center, and designed to “scoop up” the flow of the public from these plazas. This area leads directly into the instrument space from the lobby; the circulation space extends across the entire width of the building on the ground level and guides the occupants around the programs in place there. These programs include one of the large rehearsal/performance halls – the double-height small chamber ensemble hall with double-doors to connect it to the instrument chamber space – as well as a mix of smaller and larger practice rooms and classrooms. The loading dock is placed toward the back of the building, extending to 13th Street to allow trucks to park easily without an interruption to the building’s more public face. A storage area to the side as well as the closely-positioned freight elevator maximizes the efficiency of loading and unloading at the dock. Three sides of the building have entrances/exits on the ground floor: the Peachtree front contains the main public entrance; the 13th Street front has a side door for students, faculty, and staff; and a more private back entry/exit allows for the circulation to flow across the building. At the back opening, a small courtyard offers an opportunity for rest and potentially a small performance area, as well as giving a quieter face to the residential neighborhood that backs up to the site.

The second floor (Fig. 28) contains a second rehearsal/performance hall, larger

than the ground-floor hall, with its volume molded into a long, relatively low-ceilinged (but still double-height) shape that overlooks the High Museum and Peachtree Street with a large picture window to let in light. Following the typology studies, this hall flips the typical setup of such rooms by pairing a highly reflective floor with a padded ceiling and wall, curved for maximum absorptive efficiency. Like the ground floor hall, this space also has sets of double doors that open out into the instrument chamber; an interior overhang along the line of doors funnels sound outward while the doors are open, while also suggesting various ways to use the space in practice or performance. A large ensemble room/teaching studio and three smaller practice rooms, as well as a small amount of storage space, complete the second floor.

The third floor (Fig. 29) houses a third rehearsal/performance hall to the rear of the building, a smaller footprint but much taller in size (triple-height) with highly reflective surfaces, essentially acting much like a tall cathedral in its acoustic performance, with a long reverberation time. It has some double-door connection to the instrument chamber; this is limited due to its relatively small footprint. The floor itself is split-level to accommodate the shape of the instrument chamber's central space; a wide central stair connects them while offering yet another opportunity for performance space. Here, the instrument chamber is wide and open, and might act as a center for performances within this space. Six of the offices, three on either side, are placed on this floor, with slanted walls that direct the sound they generate during private lesson sessions. A number of small

and somewhat larger ensemble and practice rooms line the rest of the hallway, making the third floor a central location for student and faculty needs.

The fourth floor (Fig. 30) houses the final rehearsal/performance hall; this is a larger hall with a more normative form and material application, which could be used to perform standard modern and classical works as well as providing a closer to “normal” environment for practice and composition. This is also potentially open to the instrument chamber via the double-door mechanism. Additional offices are also on this floor, along with several small and medium-sized practice and ensemble rooms, and a small amount of storage space. Although the instrument space is relatively thinner along its extensions, the openings in the floor provide a large amount of vertical connections to the lower and upper floors. Another entry to the third-floor rehearsal/performance hall leads to a mid-level scaffolding for performances.

The fifth floor (Fig. 31) contains the remaining height of the upper two rehearsal/performance halls, with an additional entry via scaffolding to provide the opportunity to create more three-dimensional works of composition or performance. In the case of the third-level performance halls, this results in three potential vertical slots in which performers, equipment, audiences, etc. can be located, greatly expanding its experimental potential. As on the previous floors, there are additional offices, small practice rooms, and ensemble and classrooms to be used by students and faculty. Again, the instrument chamber floor has openings that connect this floor vertically to the rest of the conservatory building.

The roof of the building (Fig. 32) is accessible through all stairwells and elevators. It is a terraced garden with several spaces for performances and casual gathering; a green courtyard in the middle serves as a central focal point. The three performance areas are each surrounded by terraced seating and serve different types of performances; two are elevated (above their respective interior performance/rehearsal halls) and one sunk down. Each performance area's audience faces a different direction, meaning that three separate events could occur simultaneously; or one area could be used while allowing the others to function as meditative or gathering areas.

The overall appearance of the building is muted visually through a wrapped façade. This aluminum panel system is porous, providing a hint of the building's mass while smoothing out the visual differences between floors from the exterior. At the entryways, this system is lifted to allow program elements to slip under it without much disturbance to the overall form, which is more subtle and generally follows the outline of the site. The emphasis therefore remains with the sounds generated by the building and its relationship to the city; at night, performance areas may be lighted from the interior to provide a suggestion of its use, highlighting the conservatory's ultimate educational mission focused on sound.

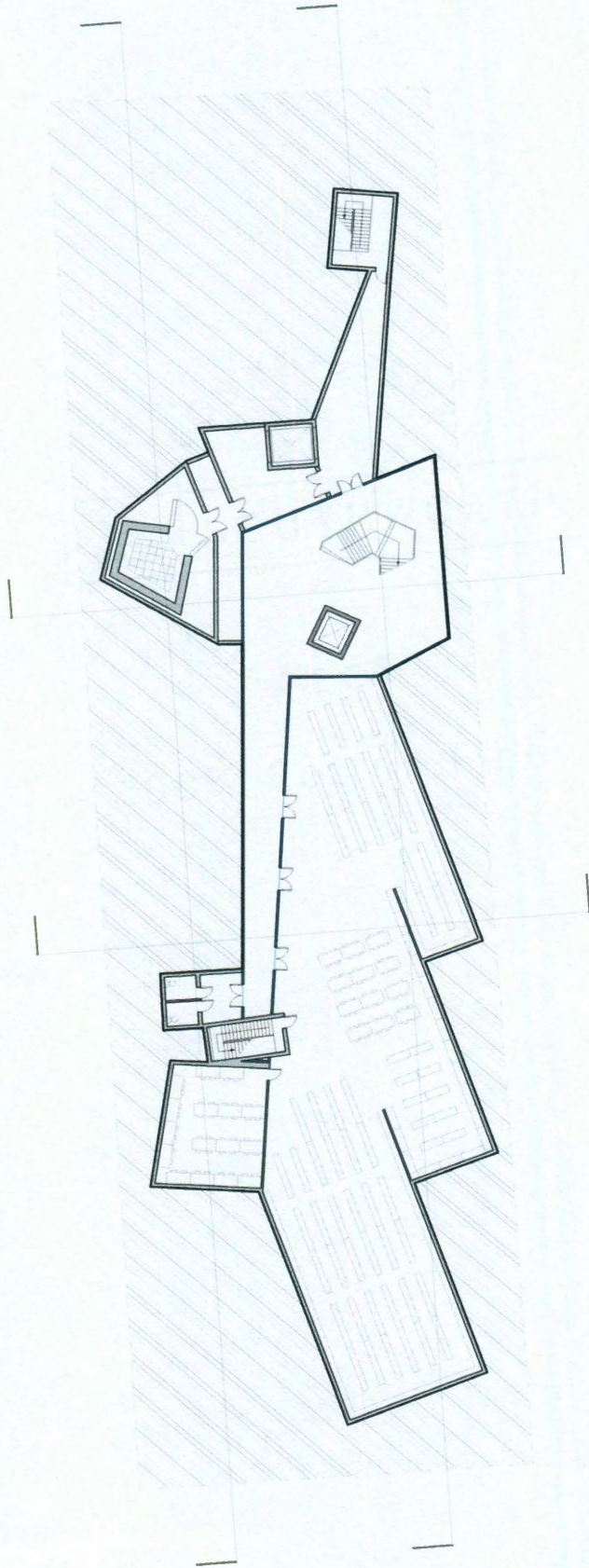


Figure 25: Secondary basement level (B2) plan.

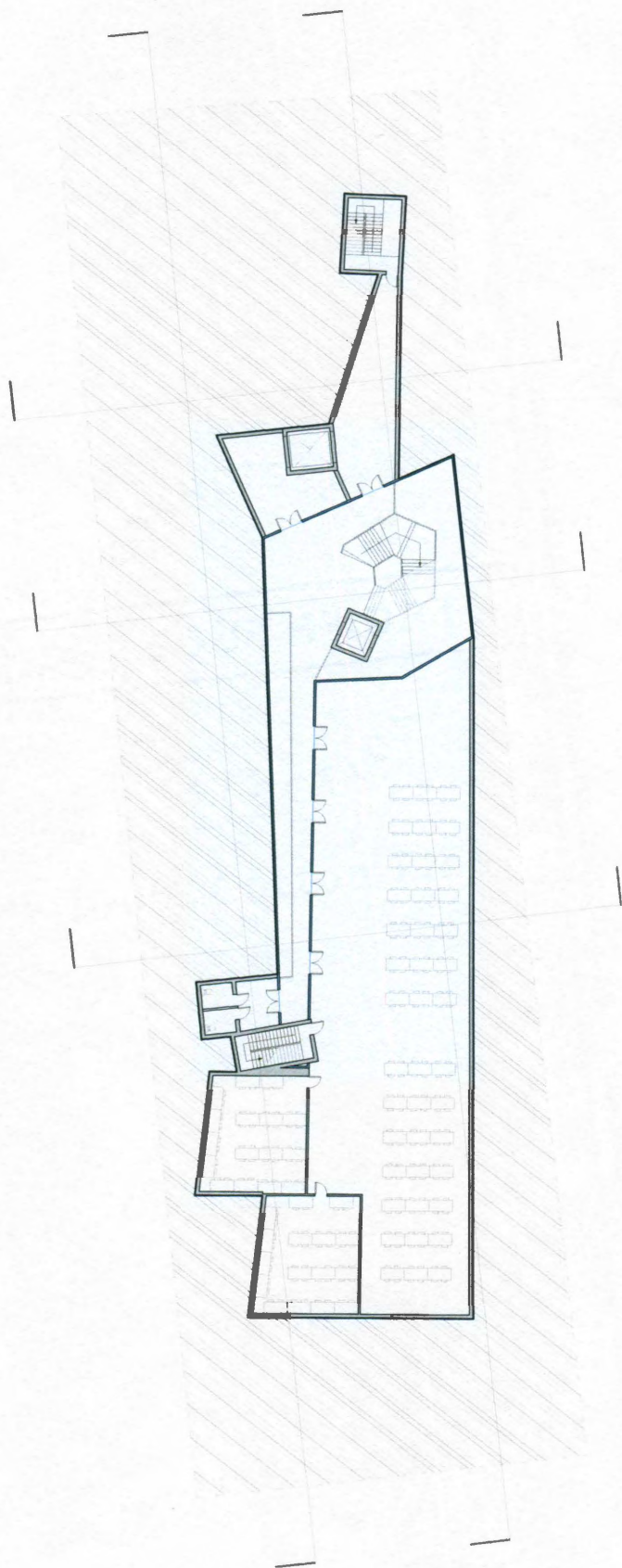


Figure 26: First basement level (B1) plan.

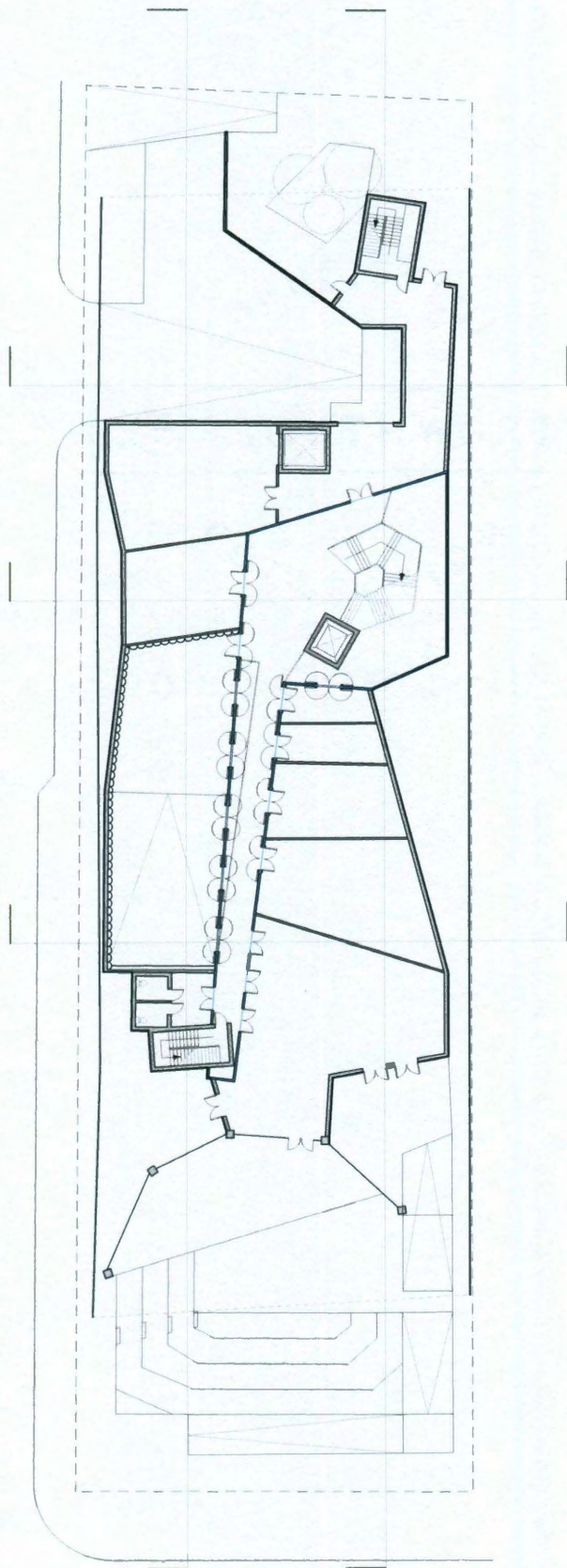


Figure 27: Ground level plan.

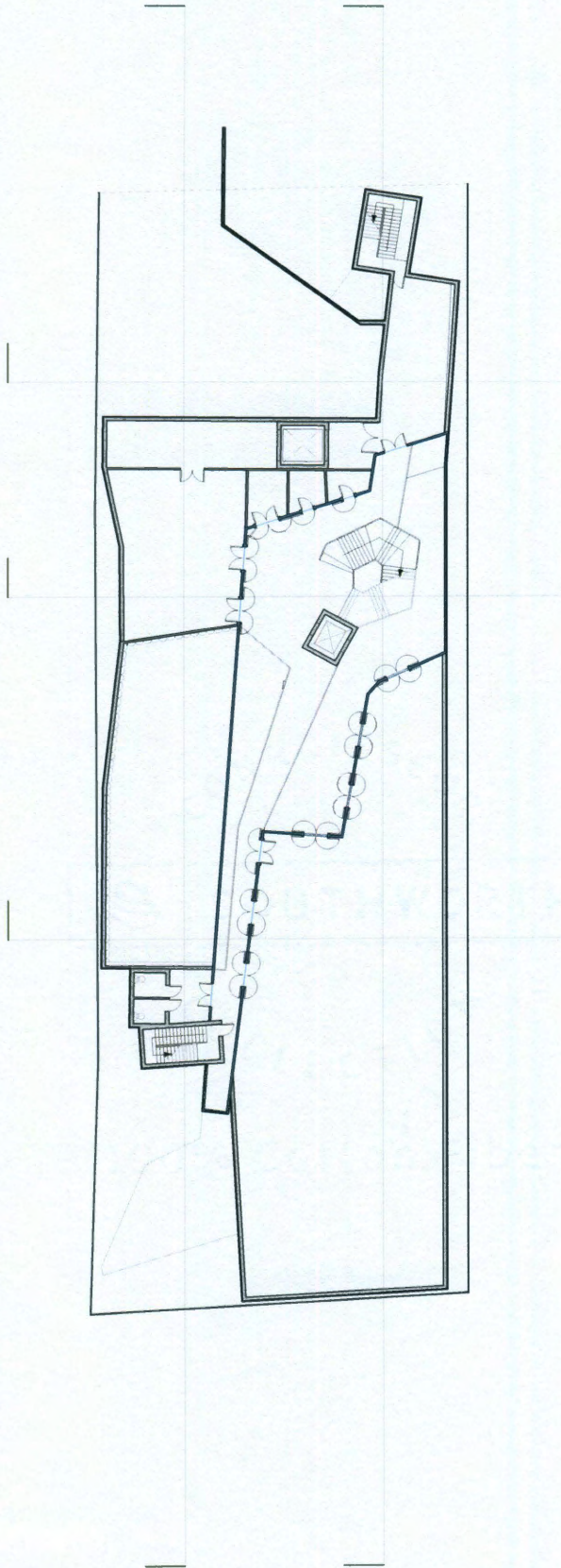


Figure 28: Second level plan.

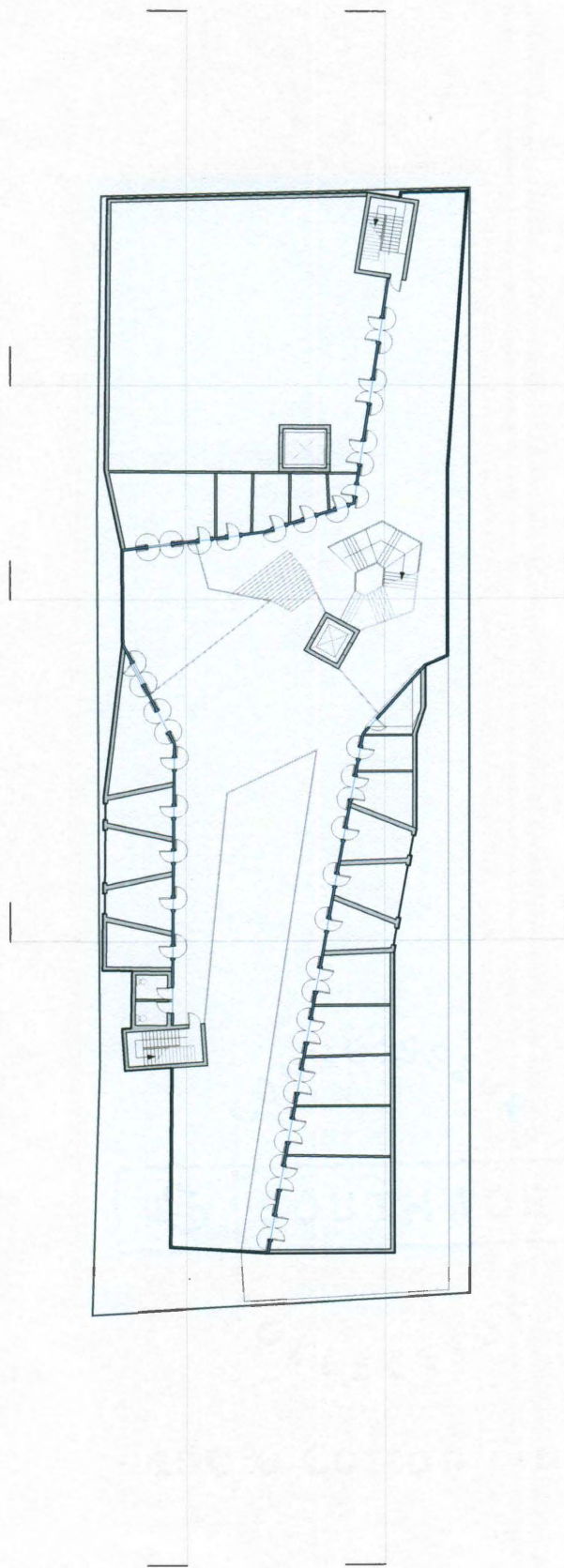


Figure 29: Third level plan.

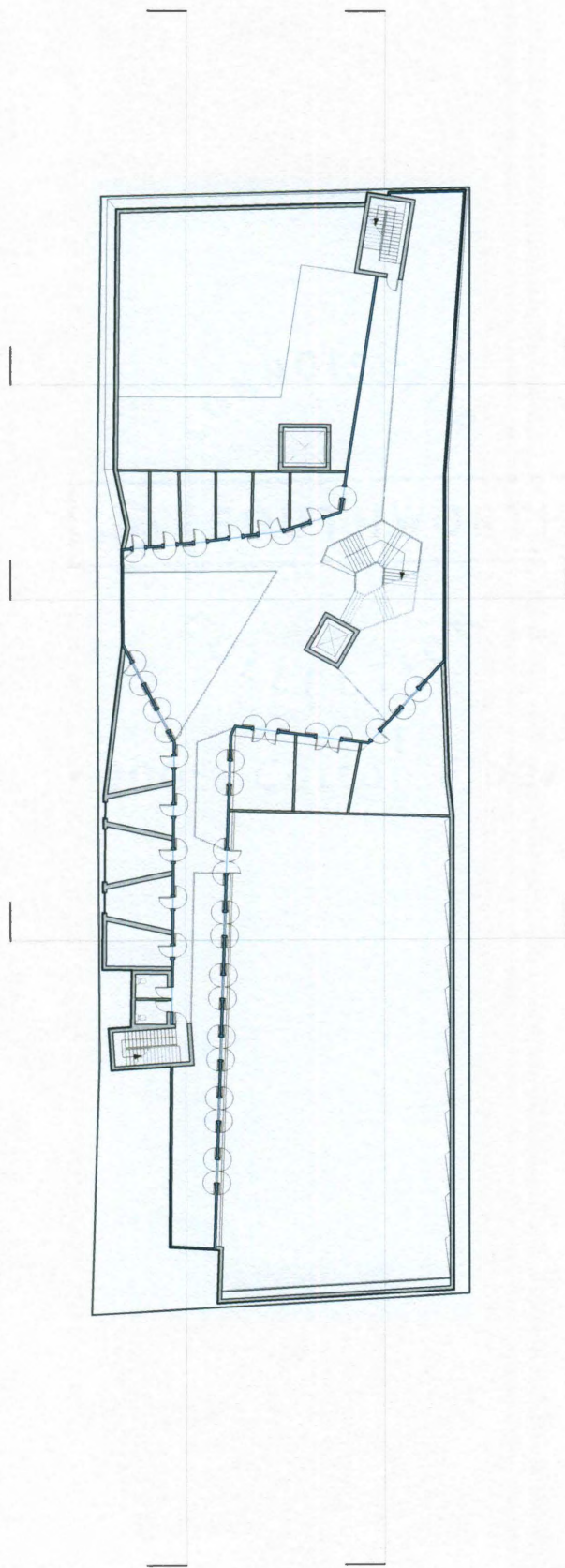


Figure 30: Fourth level plan.

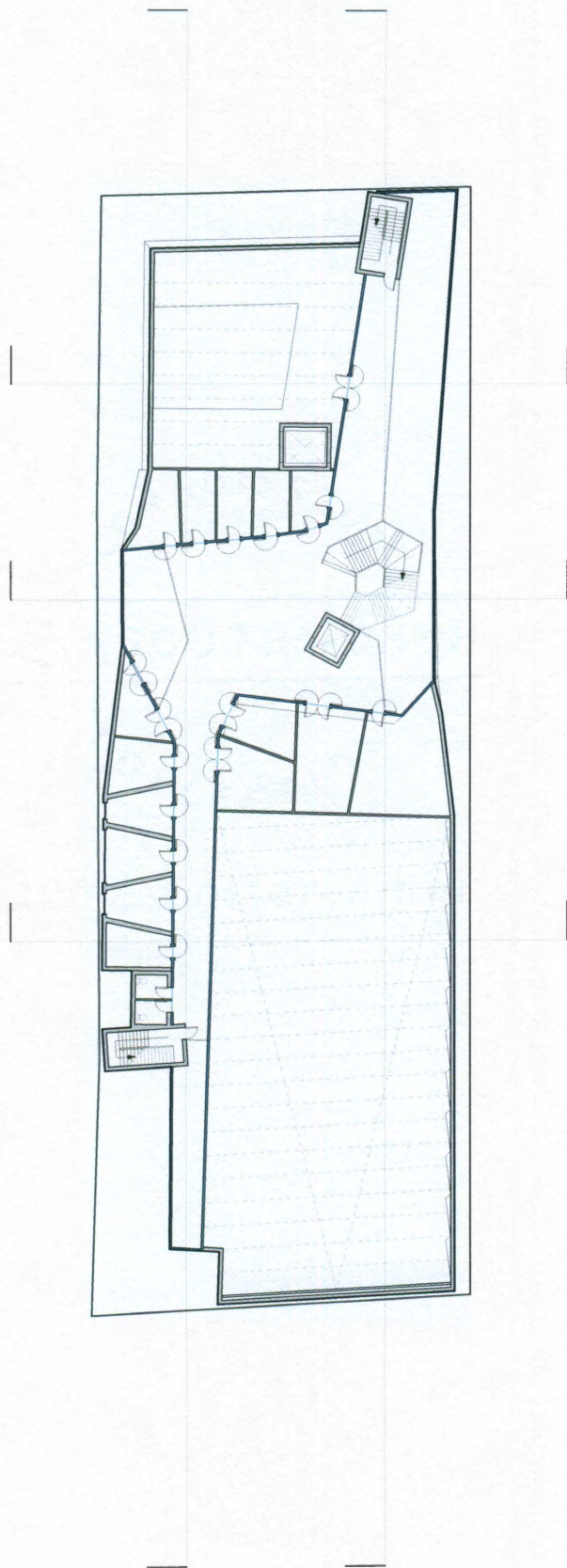


Figure 31: Fifth level plan.

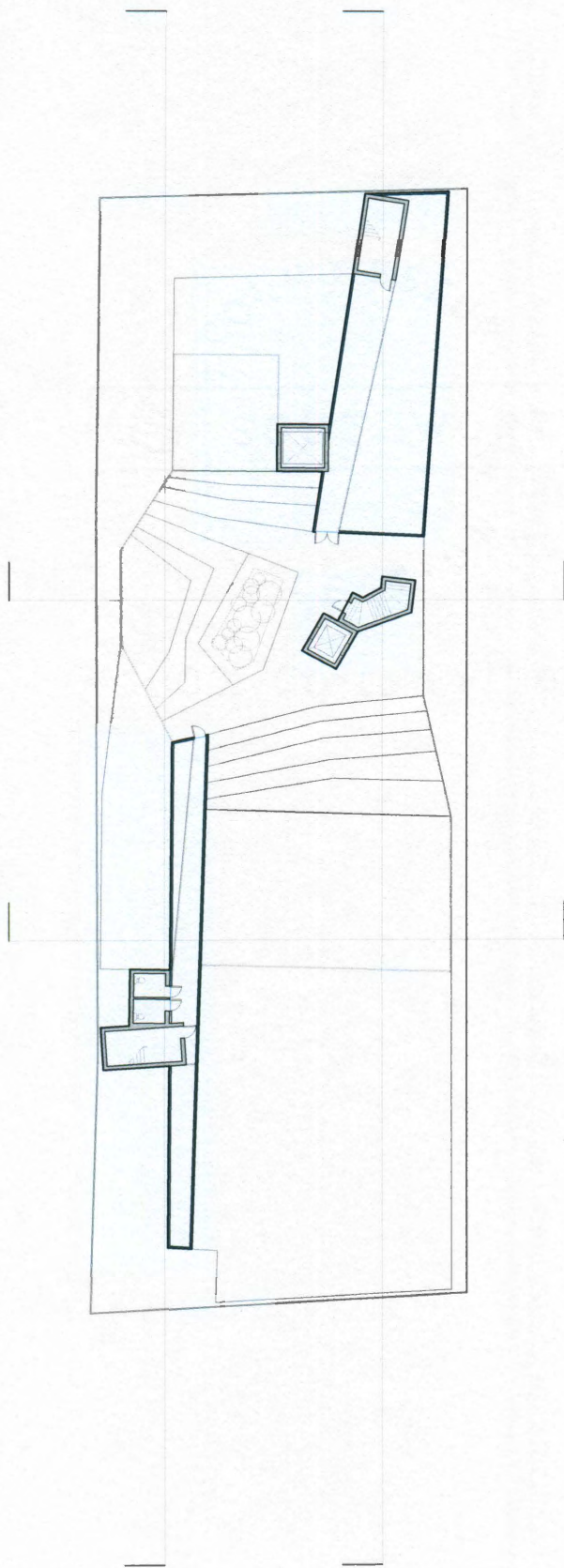


Figure 32: Roof plan.

The Program Deployed: Environment, Form, & Cultivation of Music ⁷⁷

The main focus of the design is on the areas specifically created to encourage the cultivation of new sound forms, types, and performances (Figs. 33 and 34). In particular, the main circulation instrument space, the rehearsal/performance halls and areas, and the supporting practice and ensemble rooms are considered to be the most important programs.

The instrument chamber space is the driving force of the overall building design. With two arms that extend across the length of the building, and vertical spaces that span every floor, this central space dictates the shape and layout of every other program element. Although it contains many different types of spaces – including everything from small nooks around corners to tall, thin vertical elements – it can be thought of as one continuous, interconnected space. Each floor is opened to enhance this connection, especially in the vertical dimension; nearly half of every floor is open to below, with the remaining floor space acting more as bridges between each room than as a solid horizontal plate. The material given to this instrument chamber emphasizes this continuity. The walls of the entire chamber are all wood planks, built at an angle to provide a more diffusive surface. The acoustic effect of this wood varies depending on the type and relative volume of each smaller space, but generally has a high reflective quality with some diffusion, and the tendency to carry the sound along the chamber's interior – again connecting the sounds created within these smaller areas to the larger whole. Visually, the wood creates warmth (also reflected in the

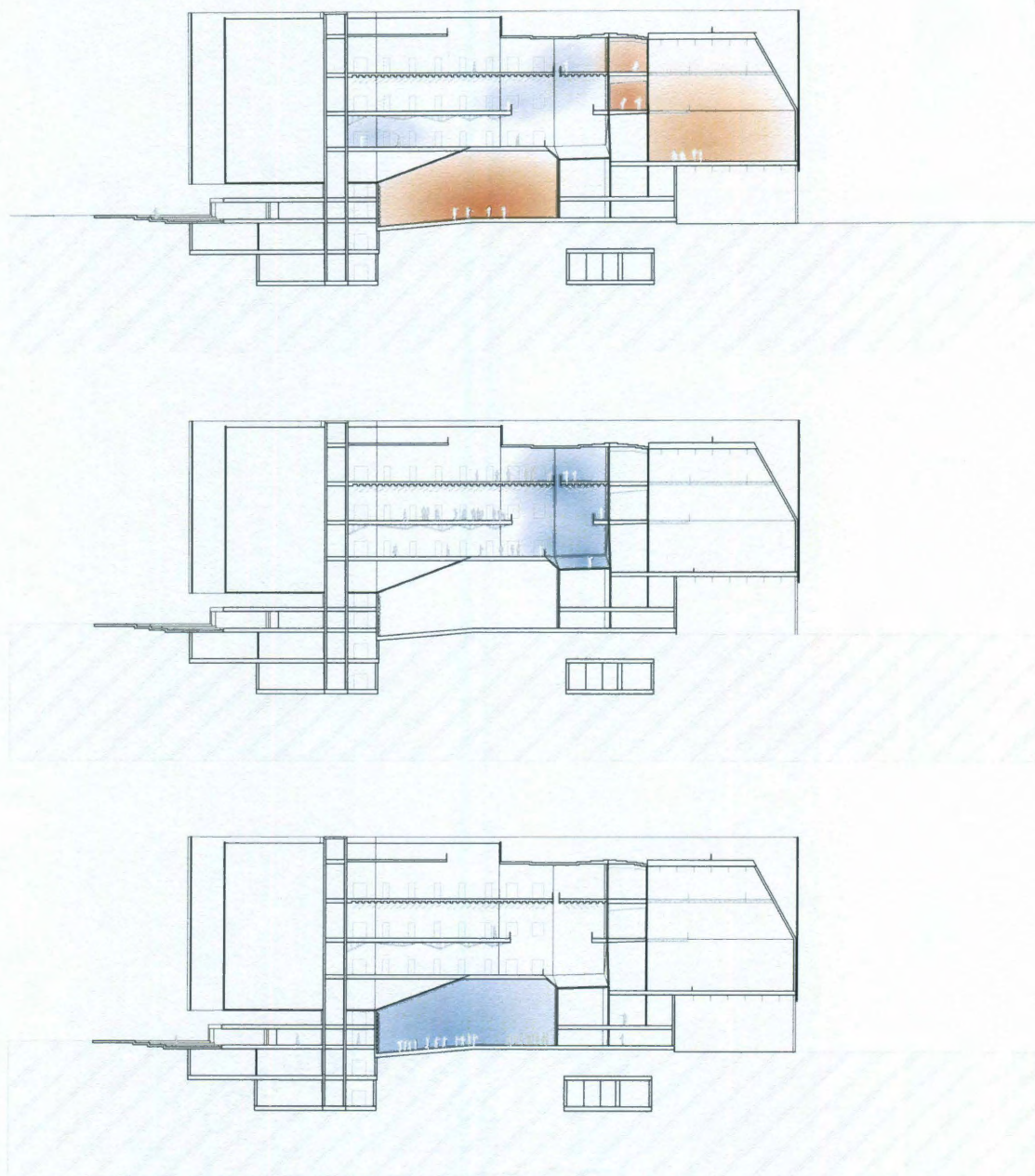


Figure 33: "Atmospheric" sections highlighting different potential uses of the conservatory.

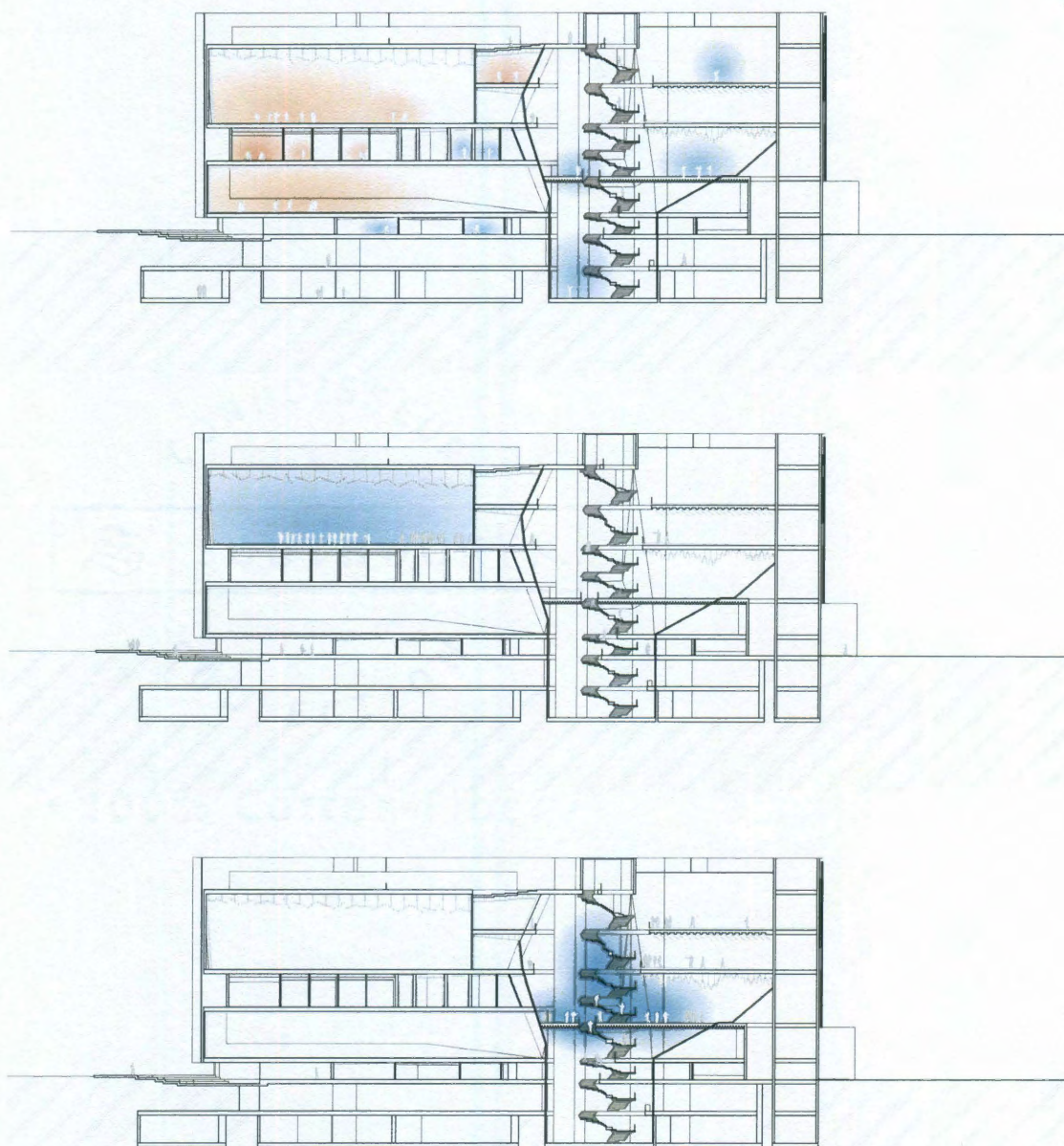


Figure 34: "Atmospheric" sections, cont.

relatively warm sounds it generates) and an inviting feel in the circulation space. This continuous surface is broken slightly by the slit windows, which are in line with the vertical wood slats and let in light to the interior of the chamber. Although this highly-reflective surface naturally changes the character of the sound in their respective spaces, these glass windows are scattered to diffuse these effects throughout the instrument chamber.

The “interrupting” elements that occur in the space of the instrument chamber include the fire stairs, elevators, bathroom core, and main central stair. The floorplate for each of the levels also functions similarly, breaking up the fluid continuity of the instrument chamber space. In each of these cases, different forms and materials are used to emphasize this interruption, rather than hiding the differences; this aligns the visual impact of the space with its intended aural function. The shafts of program that interrupt the space most prominently are the closed spaces – in particular, the two fire stairs as well as the bathroom core. These are all treated as raw structural elements – that is, they showcase the manner of construction, in this case concrete, rather than being covered by an alternate material. These cores pierce through the space, highlighting both their difference from the space of the instrument chamber and, by virtue of their discontinuity, emphasizing the continuous space of the chamber itself. The floorplates are treated as opportunities to provide different kinds of experiences within this continuous space. Each area is treated in form and material to provide these nooks and crannies with new acoustic environments; each of these are

made to be different while still allowing the generated sounds to combine via the continuous space, producing a rich and varied surface to explore and cultivate new kinds of sounds. Materials used here include both extremely varied ceiling treatments and slightly manipulated flooring surfaces (both softer, such as carpeting, and harder, such as terrazzo floors and tiling). The entire spectrum of material types, explored in the material catalog, is used to provide these various experiences.

More specifically, the upper floor levels are each treated differently, based in part on their varying ceiling heights, which allows these pockets of experience to form. The third and fourth floors have the most extreme examples of these treatments. On the third floor, two variations of the same ceiling treatment are used, in combination with terrazzo flooring on both parts of the split-level. The ceilings both use foam-backed cork, sculpted by hung wires. The side towards the front of the building is less extreme, but has angles and flat surfaces made by the cork (in this case, stiffed by a secondary backing); while the side towards the rear of the building (which has a higher ceiling due to the difference in floor height) has more extreme differences within the sculpture of the ceiling treatment, with softer folds, hills, and valleys, all rounded surfaces made from the cork, with no stiffening agent in the backing. On the fourth floor, thicker and more absorbent carpeting is used in some of the spaces (alternating with other carpeting, which is more absorbent than other floor treatments in general). Along the entire surface of the ceiling, a series of movable reflective panels is used, enabling

the occupants to manipulate their own environments to a certain extent, which also allows for a near-infinite number of acoustic possibilities when each panel is angled in a different way. While this ceiling treatment is generally reflective, the angles made by the users provide a wide-ranging variety of diffusive effects. These effects, combined with the changing spatial volumes of each smaller area within the chamber on this floor, create a number of highly individual spaces that can suggest and drive new kinds of compositions and performances. The fifth floor is dominated by the ceiling; in opposition to the other floors, the ceiling here changes drastically in height depending on the area occupied; both the “arms” of the chamber space, which protrude on the roof to allow access, and the terracing of the interior, change the interior landscape of the ceiling and provide very different experiences from space to space even without taking into account their respective materials. Additionally, the larger areas of glass on the skylights (again on the “arms” of the chamber space) create pockets of highly-reflective material that drastically change the acoustic character of that specific area, contributing to the overall environment of the instrument chamber space.

While the ground floor is treated in a more visual way, accounting for its greater role in the building’s circulation, these material applications extend across this level as well, including the interior wood of the chamber space and the individual material applications of each rehearsal hall and practice room. A larger amount of glass allows a greater amount of sunlight into the lobby area, especially the large windows that form the rear of the outdoor performance area. Again, these glass

areas greatly increase the reflectivity of the sound generated; in the performance space, any sound traveling backwards gets immediately reflected outward, increasing the sound level of the performers in the direction of the audience, while in the lobby, the sound generated bounces across the space and provides a louder ambient sound level, making the space more lively in character.

The basement levels are intentionally treated to dampen sounds in the interiors, with the exception of the chamber space, which retains its interior wood paneling throughout the building. This allows for a relatively large difference in sound level between the chamber space and the quiet areas, as long as the double-door mechanisms are kept shut. When the doors are opened, the library has auditory access to the sounds contained in the instrument chamber, while the listening and composition labs remain relatively quiet due to the threshold of the library's space and materials. These labs are additionally dampened through the use of absorbent acoustic paneling, cutting down on any transmitted sounds; the surrounding soil also provides an extra measure of dampening. The recording studio, on the opposite side from the library, has thickened walls and a threshold of a hallway and storage area in addition to these measures, with anechoic paneling on the interior to provide a pristine sound environment.

Specific room typologies arose out of the form and materials catalog, especially for the most important rooms involved in the practice and performance that would occur in the conservatory program – the practice rooms and the rehearsal/performance halls. Each large hall embodies a different type of sound

environment, expanding rather than limiting the range of compositions that might be practiced, created, and performed in the conservatory. As a whole, these rehearsal/performance halls capture a range of room areas and footprints, with each of these roughly adhering to a typical auditorium size. Two are smaller, meant for chamber or similarly limited-size ensembles; two are larger, meant to suggest the more typical symphonic halls built for larger ensembles, which enables a greater flexibility for the building as a whole. Each one creates a vastly different sound environment through the use of both form and material – not only the footprint itself, but the volume, walls, ceilings, and floors each contribute to the unique sounds of each hall.

The small ground-level hall's footprint is a kind of cross between a rectangular and an elongated fan shape, two very typical footprints for small chamber halls. In this case, the combination of these forms combined with the conformity to the shape of the instrument chamber ultimately forms both the footprint and the volume and distribution of the room's space. The floor is slanted slightly, allowing for more unique ensemble arrangements and enabling the sounds to be opened up before interacting with the rest of the room. This slanted floor also allows for a slightly higher ceiling, especially important to maintain enough volume for this relatively small footprint. The nature of the room is highly absorbent, with the room having an overall short reverberation time. Again this is in keeping with a typical chamber hall, which might be ideal for performing classical works such as Bach. In this case, the reverberation time might even be shortened further

as needed – by adding even more absorbent material to the polycylindrical absorbers – meaning that contemporary compositions needing a very dry room could be performed in this space. More polycylindrical material acts diffusively, a function that serves to distribute sound energy through the entire room in place of more reflective material.

The method of overall design is one that combines both form and material to create a number of individual sound spaces and rooms, allowing a wide variety of performances and practices to occur within the building, while also encouraging public involvement and an interconnectedness to the institution's surrounding context. The expectation is that the conservatory will act as a porous object or collection of fields, within which performers, composers, audiences, and other occupants act to create new kinds of sounds. By creating a diverse set of potential environments, the goal of education – both of the students and of the public – will be achieved in a myriad of ways. Although the actual, precise characteristics of each room and space are difficult to predict, the element of the unexpected and the idea of exploring these new creations is well-aligned with the methods and techniques practiced in many forms of this kind of music.

Experimental music can therefore be taught, performed, and composed in a much more direct manner in this new institution than typical conservatories allow. The flexibility of the building as a whole additionally creates the opportunity for individual environments to completely change while preserving the ideas and structure of the institution. The simultaneous encouragement of new forms and

preservation of ideas is at the heart of this process of cultivation – allowing the new and changing to flourish while being grounded in a larger reality. This is the final implementation of the principles behind experimental music, and the direct result of designing for sound and its perceptual effects within memory and the human body.



Figure 35: Entry/outdoor performance space perspective, looking toward the High Museum.



Figure 36: Roof perspective, highlighting terraced seating and performance area, looking outward toward 13th Street.



Figure 37: Interior perspective through the instrument chamber, showing one “arm” of the chamber and cork-backed foam ceiling treatment.



Figure 38: Small, high-ceiling/small footprint practice room with thin quadratic diffusers as the main form of surface treatment.



Figure 39: Interior perspective of the instrument chamber space, showing the third floor (split-level) and the larger circulation space used as a performance venue.



Figure 40: Lower-ceiling, larger-footprint practice room, with acoustic panels and wood-slat ceiling.

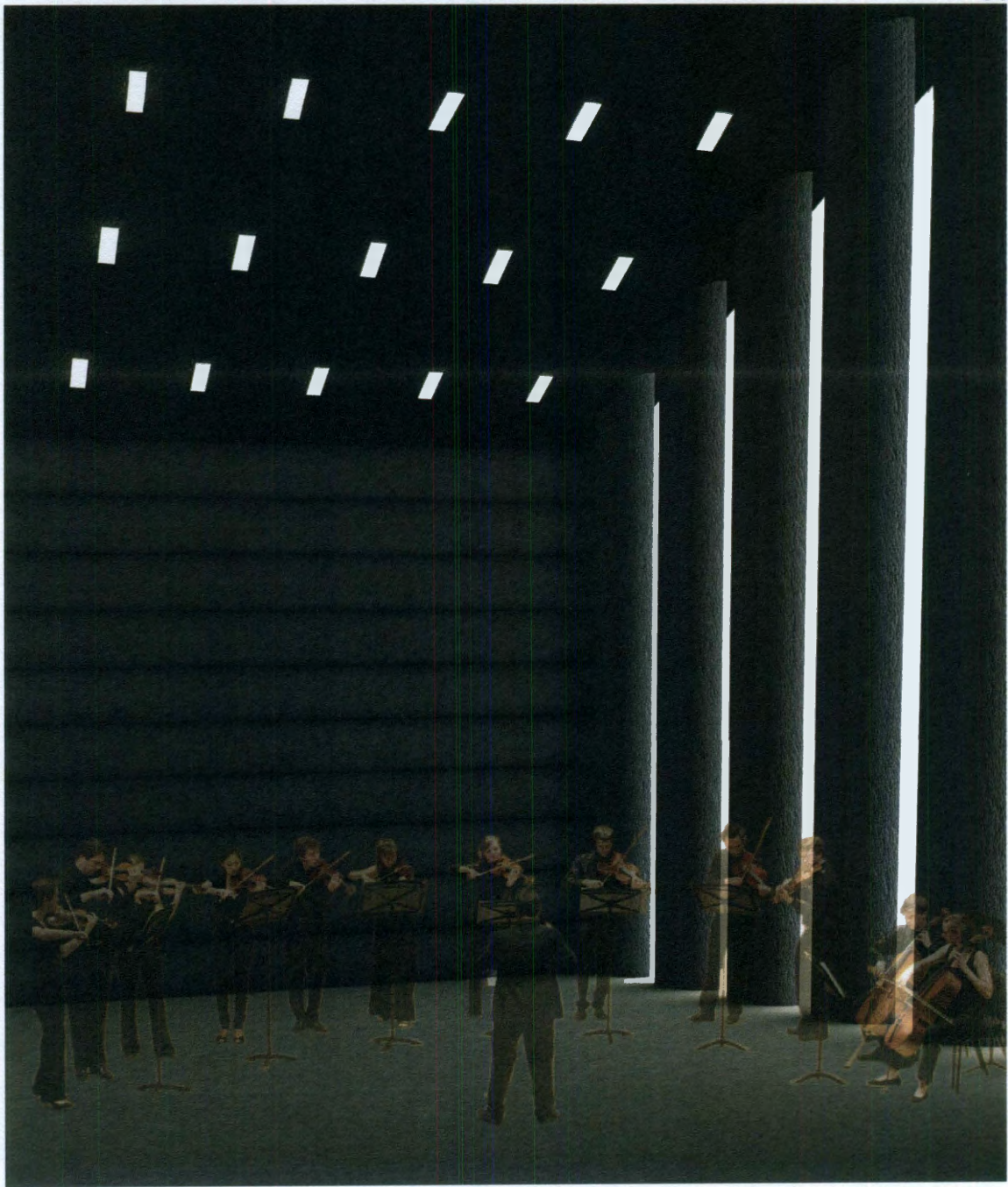


Figure 41: Ground-level performance/rehearsal hall with polycylindrical elements and slanted floor and ceiling.

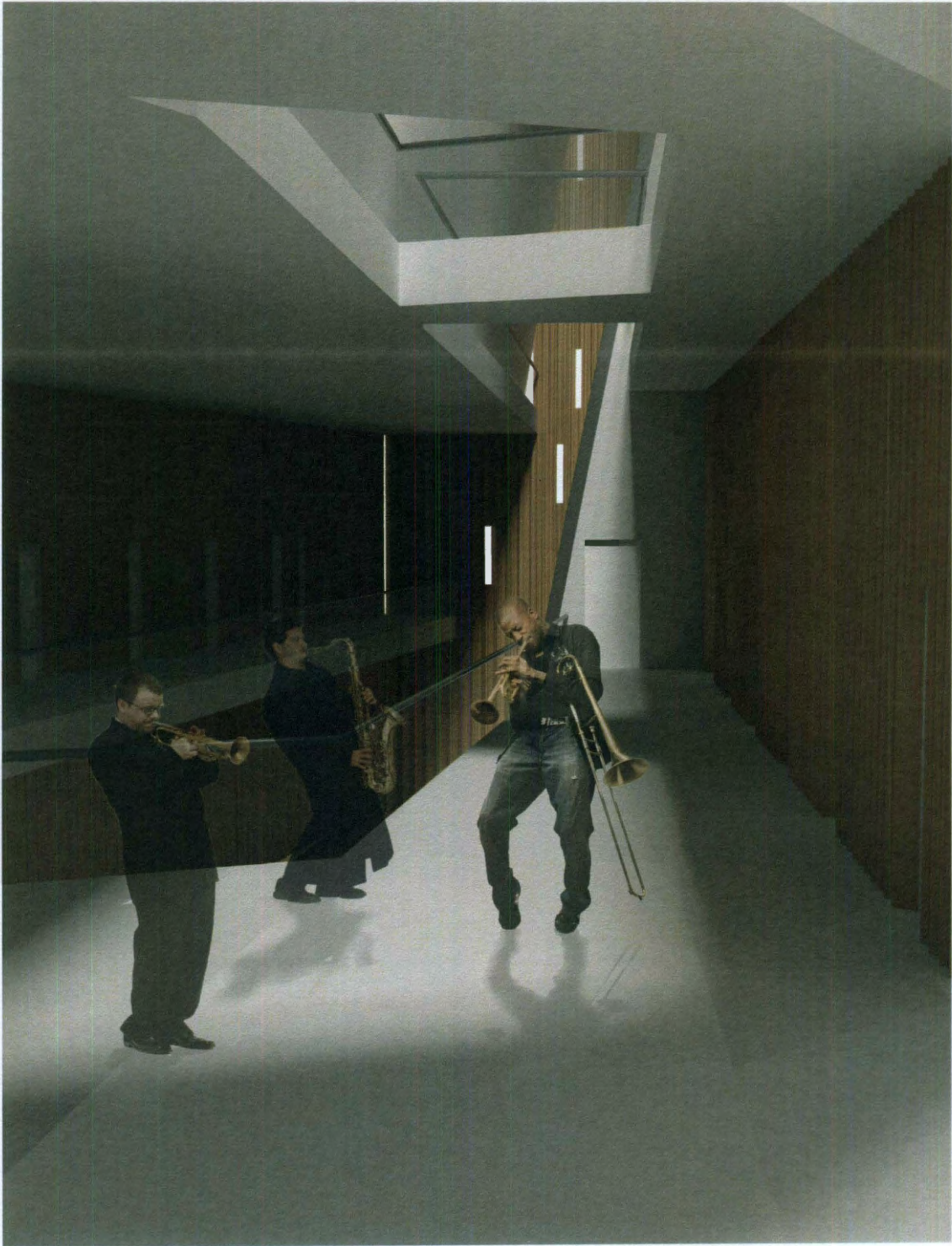


Figure 42: Interior perspective of the instrument chamber space, highlighting forward “arm” and its openings used as a rehearsal/performance space.

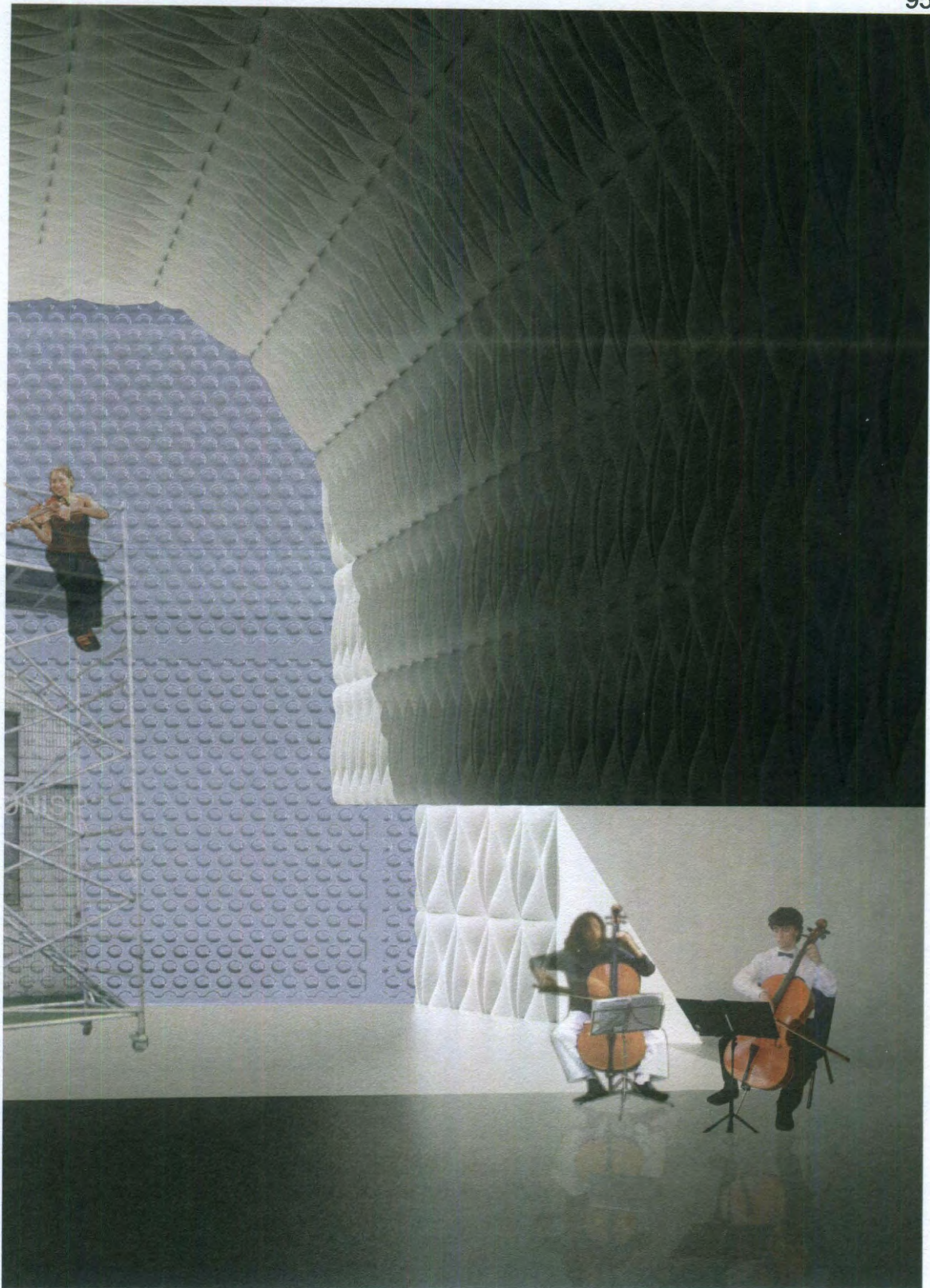


Figure 43: Second-floor rehearsal/performance space with reflective floor and padded walls and ceiling, with overhang and additional temporary scaffolding.

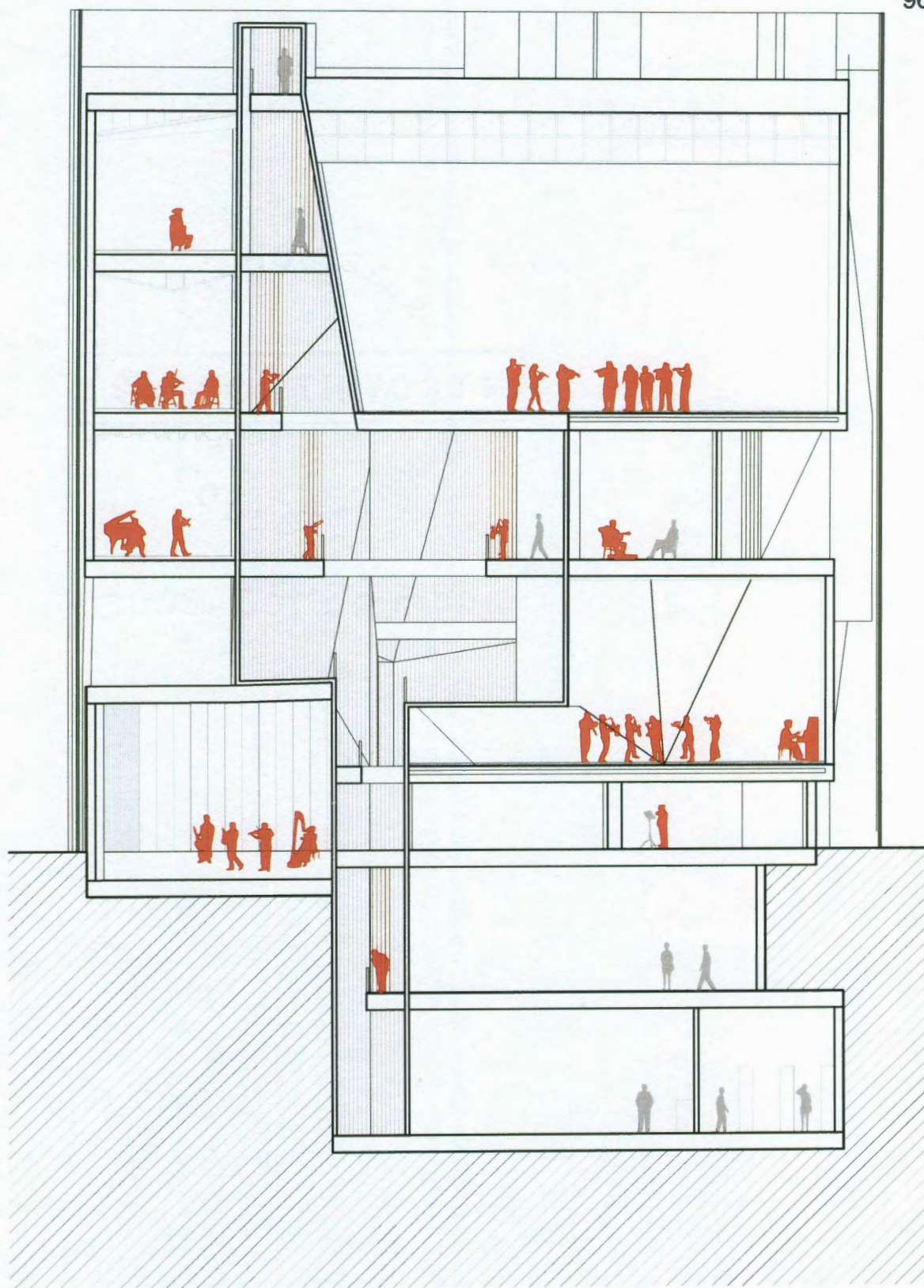


Figure 44: Transverse section through forward "arm" showing three main performance/rehearsal halls.

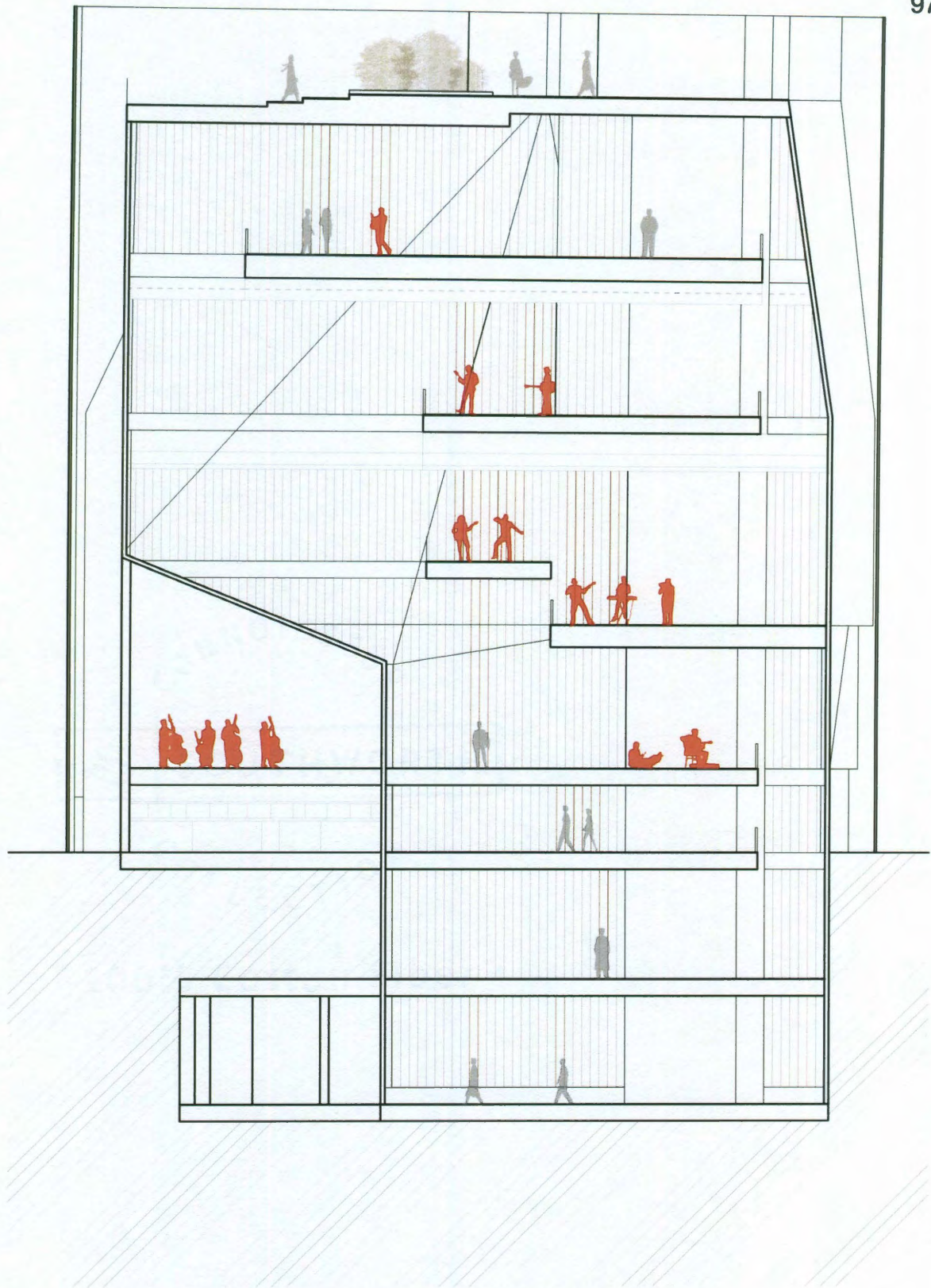


Figure 45: Transverse section through larger circulation space.

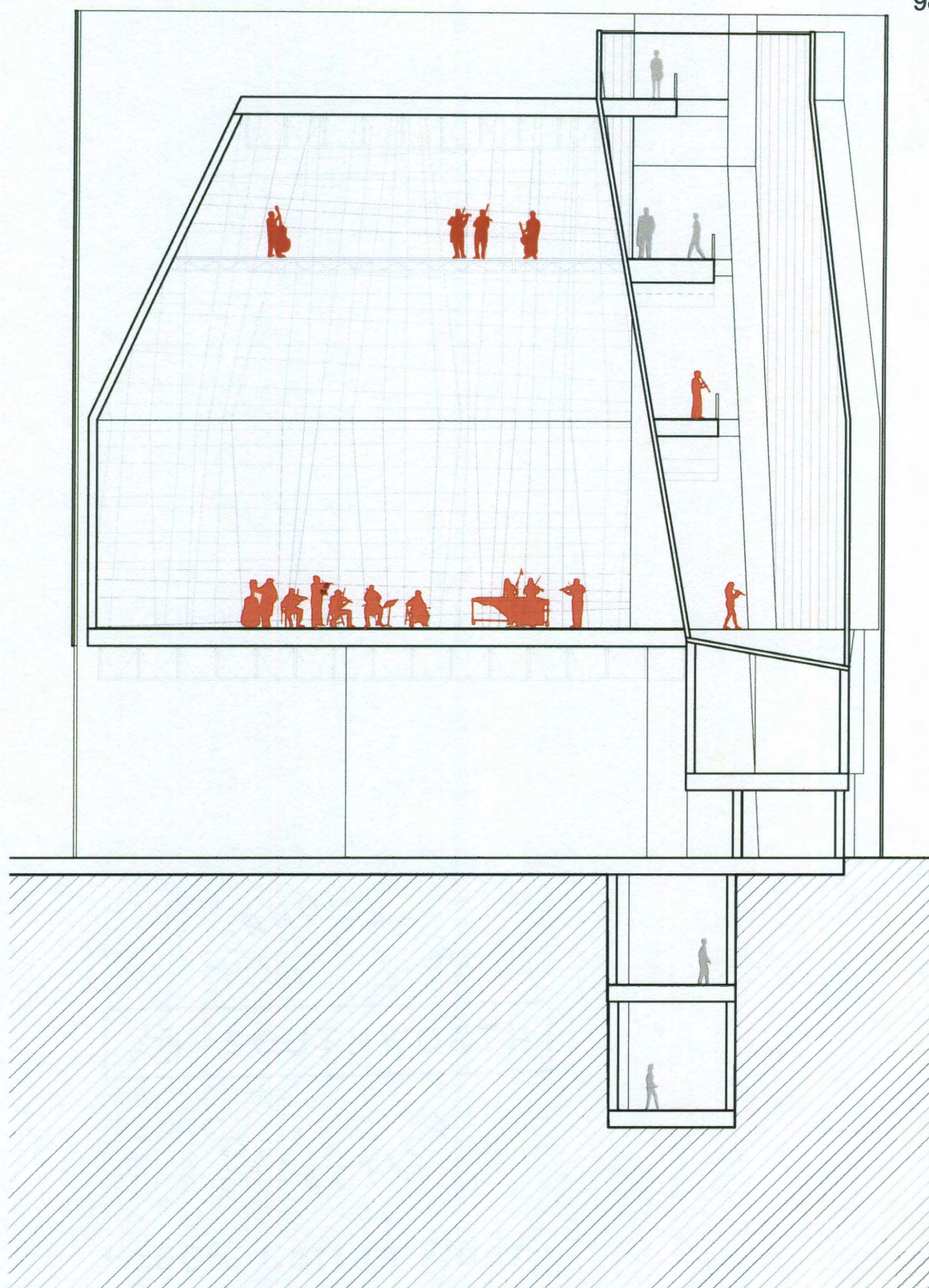


Figure 46: Transverse section through rear “arm” of instrument chamber, highlighting large rehearsal/performance hall with scaffolding.

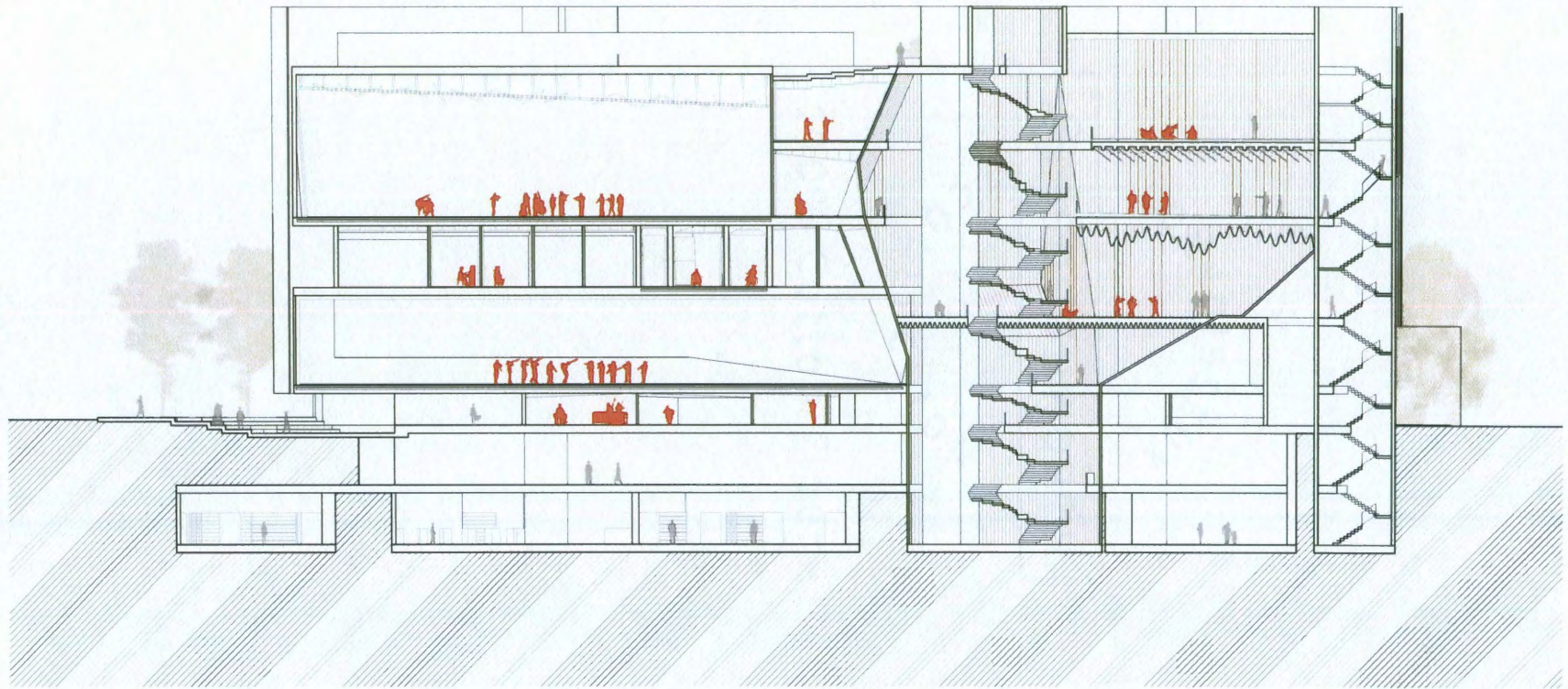


Figure 47: Longitudinal section through the center of the conservatory, including main stair and two performance/rehearsal halls.



Figure 48: Close-up detail of longitudinal section, highlighting entry and outdoor performance space.

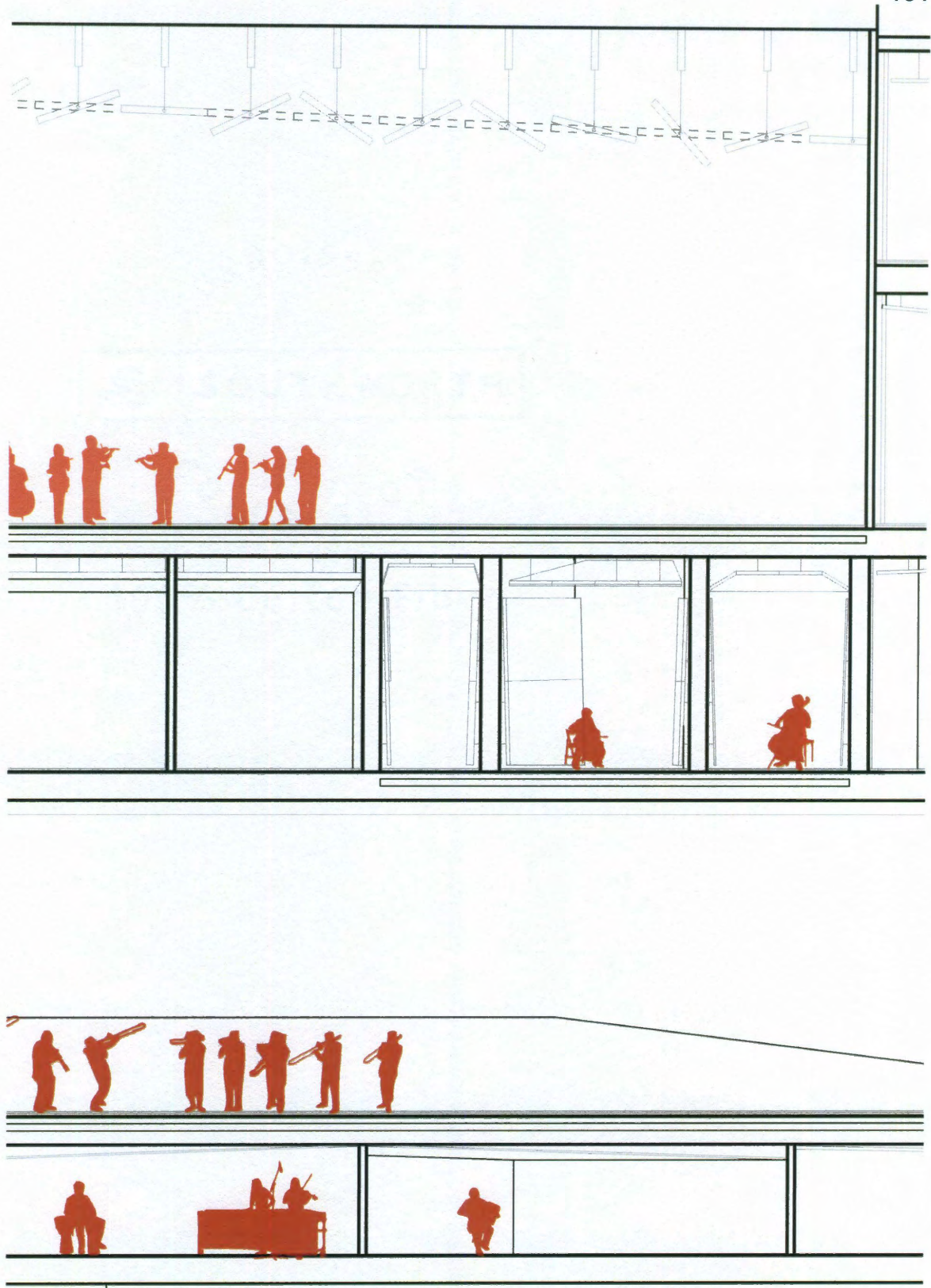


Figure 49: Close-up detail of longitudinal section, highlighting two of the main rehearsal/performance spaces and small practice rooms.

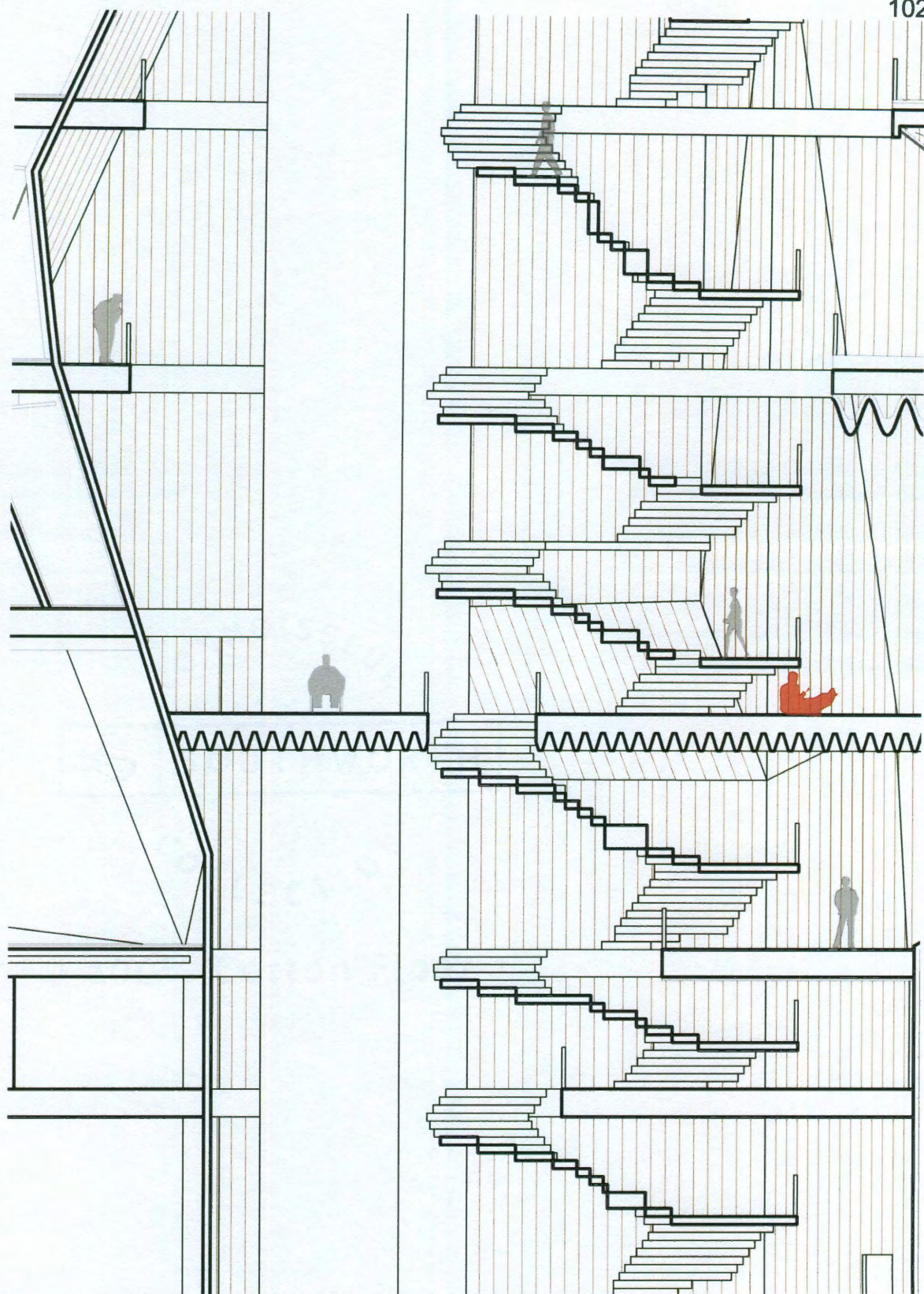


Figure 50: Close-up detail of longitudinal section, highlighting main circulation stair and elevator shaft.

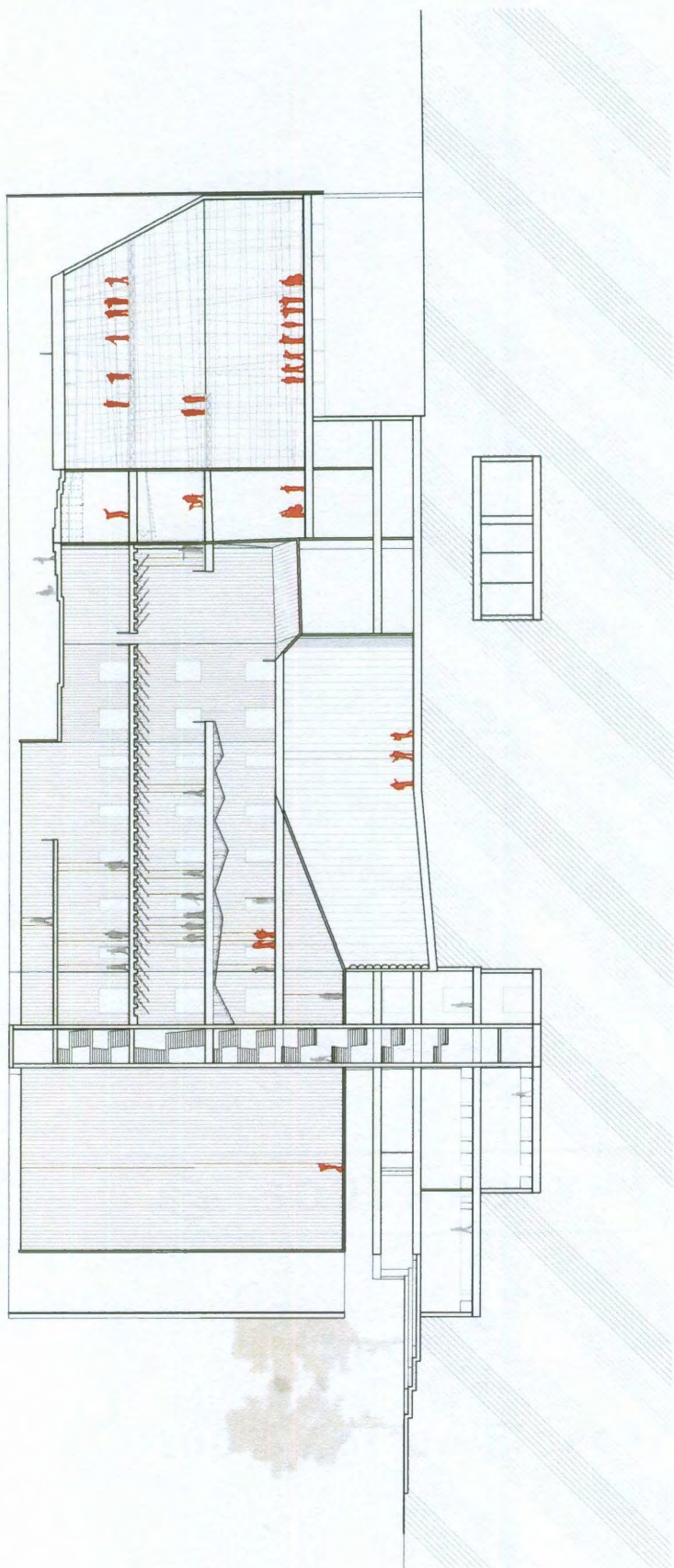


Figure 51: Longitudinal section through forward "arm," toward 13th Street, highlighting the other two performance/rehearsal halls.

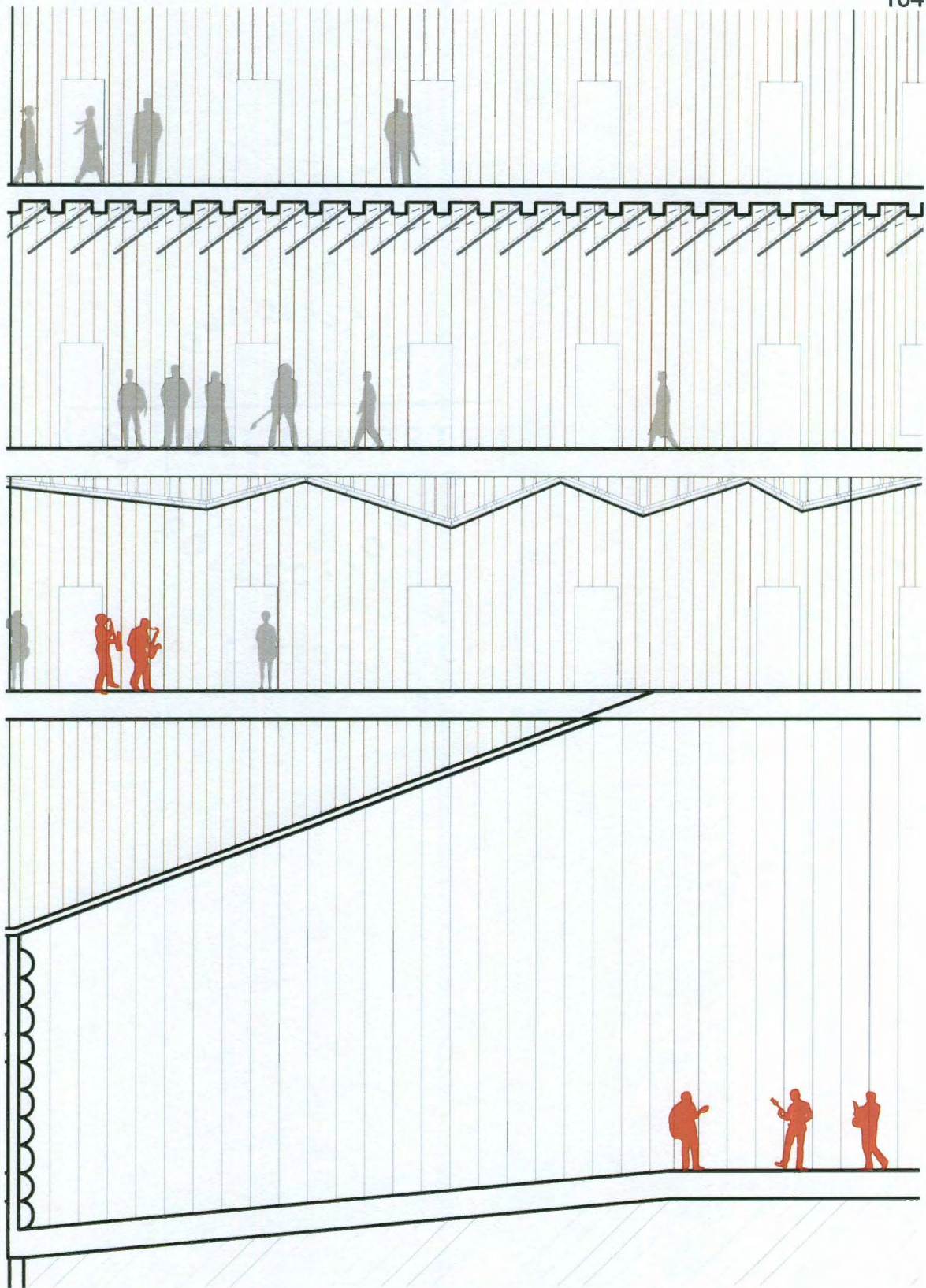


Figure 52: Close-up of longitudinal section highlighting the ground-floor rehearsal/performance hall and the instrument chamber space above.

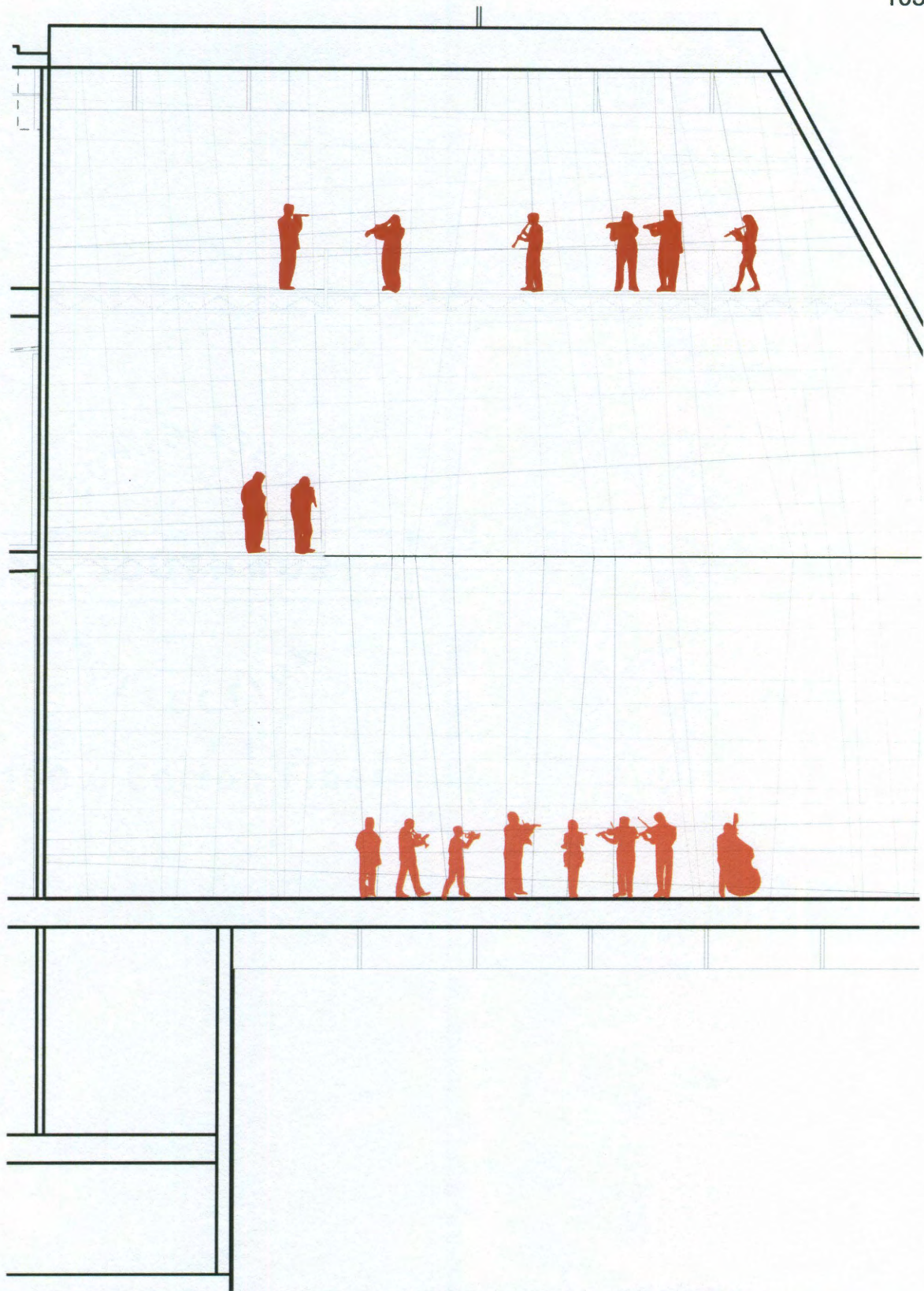


Figure 53: Close-up of longitudinal section highlighting the third floor rehearsal/performance hall and its scaffolding during a performance.

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